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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, A. D. 1940

STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO and STATE OF PENNSYLVANIA, *Complainants,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 2 Original
STATE OF MICHIGAN, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 3 Original
STATE OF NEW YORK, *Complainant,* *vs.* STATE OF ILLINOIS and THE SANITARY DISTRICT OF CHICAGO, *Defendants.*	No. 4 Original

BRIEF OF WISCONSIN, MINNESOTA, OHIO, PENNSYLVANIA, MICHIGAN AND NEW YORK IN OPPOSITION TO ILLINOIS' EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER DATED MARCH 31, 1941.

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Filed: April 30, 1941.

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PART ONE

A. NATURE OF THE ACTION AND ISSUES INVOLVED.

I. A HISTORY AND STATEMENT OF THE CASE.

The State of Wisconsin filed the first of these bills on July 14, 1922. The Wisconsin bill was amended on October 5, 1925, and the State of Minnesota, Ohio and Pennsylvania became co-plaintiffs. The amended bill sought an injunction restraining the State of Illinois and the Sanitary District of Chicago from causing any water to be taken from the Great Lakes-St. Lawrence watershed in such manner as permanently to divert the same from that watershed. On April 8, 1926, the State of Michigan filed a separate bill for the same relief. On October 18, 1926 the State of New York filed a separate bill for the same relief. Subsequently the three suits were consolidated for the purpose of hearing (*Wisconsin* v. *Illinois*, 278 U. S. 367, 369-70) and heard by Hon. (now Chief Justice) Charles Evans Hughes as Special Master.

Thereafter the Special Master duly filed his Report in which he found that the diversion of water from the Great Lakes-St. Lawrence watershed by said defendants had lowered the level of Lakes Michigan and Huron approximately six inches, the levels of Lake Erie and Ontario approximately five inches and the levels of connecting Rivers, Bays and Harbors to the same extent. (Report of Special Master Hughes, filed November 23, 1927, pp. 104-5). The Master further found that the extent of the lowering of said waters was in direct proportion to the extent of the diversion and that an increase of 1500 c.f.s. in the diversion would produce an additional lowering in said waters of approximately one inch. (Report of Spe-

cial Master Hughes, filed November 23, 1927, p. 105). As a result of this diversion, the Master found that the complainant States and their people had suffered substantial damage to their navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other interests and to riparian property generally. (Report of Special Master Hughes, filed November 23, 1927, pp. 105-118). The Master's finding in this respect was confirmed by this Court (*Wisconsin et al.* v. *Illinois et al.*, 278 U. S. 367 at 407-9).

Upon the consideration of the Master's Original Report and the exceptions filed thereto, this Court held in *Wisconsin, et al.* v. *Illinois et al.*, 278 U. S. 367, that the diversion of water from the Great Lakes then maintained by the State of Illinois and the Sanitary District of Chicago was unlawful and in violation of the rights of the complainant Lake States, that the Sanitary District was under a legal duty to provide some other means of disposing of the sewage to the end that the unlawful diversion might be terminated, that in keeping with the principles of a Court of Equity, the defendants (Illinois and the Sanitary District of Chicago) would be afforded a reasonable time within which to provide other means of disposing of the sewage and that thereafter there would be a final, permanent, operative and effective injunction.

Thereupon this Court again referred these causes to the Special Master for a determination of certain questions deemed to be essential to the formulation of an appropriate decree which, while avoiding unnecessary hazard to the health of the people of the Sanitary District, should nevertheless terminate the unlawful diversion and restore the rights of the complainants as speedily as possible. The Report of the Special Master on rereference was filed December 17, 1929, and on March 14, 1930 this court

rendered its decision (*Wisconsin, et al.* v. *Illinois, et al.*, 281 U. S. 179).

On April 21, 1930, the decree of the Court was entered (281 U. S. 696). This decree provided, in part, that, (1) on and after July 1, 1930, the diversion of the waters of the Great Lakes-St. Lawrence system through the Chicago Drainage Canal should be reduced to an annual average of 6500 cubic feet per second, in addition to domestic pumpage, (2) on and after December 31, 1935, this diversion should be reduced to 5000 cubic feet per second, in addition to domestic pumpage, and (3) on and after December 31, 1938, this diversion should be reduced to 1500 cubic feet per second, in addition to domestic pumpage.

In October 1932, the states of Wisconsin, Minnesota, Ohio and Michigan applied for the appointment of a Commissioner or other special officer to execute the decree of April 21, 1930 (281 U. S. 696) on behalf of and at the expense of the defendants. The above named Lake States complained of the delay in the construction of the works and facilities embraced in the program of the Sanitary District of Chicago for the disposition of sewage so as to obviate danger to the health of the inhabitants of the District on the reduction in diversion on December 31, 1935 and December 31, 1938, in accordance with the decree, in the diversion of water from Lake Michigan through the Drainage Canal.

The court appointed Edward F. McClennen as Special Master to make summary inquiry and to report thereon to the court (278 U. S. 578). The Special Master proceeded accordingly and after full hearing submitted his report and recommendations. Upon that report the Court on May 22, 1933, rendered its opinion (See 289 U. S. 395). On the same day, the court enlarged the decree to provide in part that the State of Illinois is required to take all necessary steps to cause and secure the completion of

adequate sewage disposal plants and sewers, to the end that the reductions in diversion may be made at the times fixed in the decree.

On January 11, 1940, the State of Illinois filed a petition with this Court for a temporary modification of Paragraph 3 of the Court's Decree of April 21, 1930, in the above causes wherein the diversion of water from the Great Lakes-St. Lawrence System or Watershed after December 31, 1938, was restricted to 1500 cubic second feet, in addition to domestic pumpage. The petition prayed that the diversion of water through the Sanitary District Canal as limited above be temporarily increased to 5000 cubic second feet in addition to domestic pumpage, until December 31, 1942, so as to avert the alleged obnoxious, noisome, unhealthy and dangerous condition claimed to exist in the Illinois Waterway.

On January 29, 1940, the Court issued a Rule to Show Cause requiring the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to show cause why the petition of the State of Illinois for temporary modification of the Decree of the Court entered April 21, 1930, and enlarged May 22, 1933, should not be granted.

On February 26, 1940, the Return of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York as Respondents, to Rule to Show Cause issued on application of the State of Illinois, as petitioner, for a temporary modification of Paragraph 3 of the Decree of April 21, 1930, was filed with the Court.

On February 26, 1940, the respondent Great Lakes States also filed their Brief in support of said Return. The State of Illinois filed its Reply Brief and Argument to the Brief of Respondent Great Lakes States on March 25, 1940. Oral arguments were heard upon the Return to the Rule to Show Cause on March 25 and 26, 1940. Thereafter,

upon consideration of the return of the Lake States who are complainants in the above entitled causes to the Rule issued January 29, 1940, and of the argument had thereon, the Court under date of April 3, 1940, rendered a per curiam opinion (309 U. S. 569, 60 S. Ct. 789, 84 L. Ed. 953) and entered an order referring these causes to the Honorable Monte M. Lemann as Special Master with directions and authority to make summary inquiry on three particular subjects therein described and to report to the Court thereon with all convenient speed (309 U. S. 636, 60 S. Ct. 791, 84 L. Ed. 992). Pursuant to this Order, the Special Master held hearings at Chicago and Joliet, Illinois, beginning on July 11, 1940. Other hearings were held in September and October 1940, and in January 1941. Oral arguments were heard in New Orleans, Louisiana, in February 1941 (Report of Special Master Lemann, p. 5).

II. THE ORDER OF THIS COURT, DATED APRIL 3, 1940, REFERRED THE CAUSES HEREIN TO A SPECIAL MASTER FOR SUMMARY INQUIRY AS TO CERTAIN ISSUES OF FACT.

The order of the Court dated April 3, 1940 (309 U. S. 636, 60 S. Ct. 791, 84 L. Ed. 992), provides in part that:

> "the petition of the State of Illinois and the return of the complainant States to the order to show cause be referred to Monte M. Lemann, Esquire, as a Special Master, with directions and authority to make summary inquiry and to report to this Court with all convenient speed with respect to the actual condition of the Illinois Waterway by reason of the introduction of the untreated sewage, and whether, and to what extent, if any, that condition constitutes an actual menace to the health of the inhabitants of the complaining communities, and also with respect to the feasibility of remedial or ameliorating measures available to the State of Illinois without an increase in the diversion of water from Lake Michigan." (84 L. Ed. 993.)

III. NO ISSUES OF LAW ARE INVOLVED AND THE ISSUES OF FACT ARE MEASURED PRECISELY AND SOLELY BY THE ORDER OF REFERENCE DATED APRIL 3, 1940.

The scope of the instant reference and the issues of fact to be determined herein are measured precisely and solely by the terms of the Order of Reference made by the United States Supreme Court on April 3, 1940. The nature and extent of the inquiry is defined by the Order of the court.

The ultimate questions of fact therefore to be determined on this reference are:

(1) What is the actual condition of the Illinois Waterway as the result of receiving untreated sewage?

(2) What is the effect of such actual condition of the Illinois Waterway on the health of the inhabitants of the complaining communties?

(3) What remedial or ameliorating measures are available to the State of Illinois without an increase in the diversion of water from Lake Michigan?

PART TWO

A. THE FINDINGS AND RECOMMENDATIONS OF THE SPECIAL MASTER AND THE ISSUES RAISED ON THE EXCEPTIONS TO THE MASTER'S REPORT.

I. THE SPECIAL MASTER DULY ENTERED HIS FINDINGS AND CONCLUSIONS AND HIS RECOMMENDATIONS ON THE THREE ISSUES OF FACT.

After extended hearings the Special Master made and filed his report dated March 31, 1941 with this Court.

In answer to the first issue of fact the Special Master found:

> "(1) The actual condition of the Illinois Waterway, by reason of the introduction of untreated sewage, creates in the summer months a nuisance through offense odors at Joliet and Lockport, but does not present a menace to health. No nuisance conditions were proven to exist along the Waterway at any other points." (Report of Special Master Lemann, p. 110.)

After due consideration the Special Master made the following finding on the second issue of fact:

> "My conclusion is that the facts proven do not establish any menace to the health of the inhabitants of Joliet and Lockport or elsewhere along the Waterway requiring an increase in diversion in water from Lake Michigan." (Report of Special Master Lemann, pp. 54, 110.)

In answering third issue raised herein, the Special Master found as follows:

> "(2) With respect to remedial or ameliorating measures available to the State of Illinois without an

increase in the diversion of water from Lake Michigan, my findings are as follows:

"(a) The dredging of Brandon Road Pool would remove chiefly old accumulations of sludge which have completely or largely lost their potency as causes of nuisance and would therefore be of extremely doubtful efficacy. It would cost between $400,000 and $750,000, plus the cost of providing spoil banks and lagoons. It would present problems as to possible nuisance from such spoil banks and lagoons and require further expense for chlorination. I do not think this is a feasible ameliorating measure.

"(b) The draining of Brandon Road Pool cannot be accomplished without some interference with navigation, to which the War Department, which has sole jurisdiction over navigation problems, will not consent. For this reason I do not think this suggestion feasible. There would also be presented problems with respect to the water intake pipes of several industies which take water for industrial purposes from the Pool.

"(c) Chlorine is an effective measure to reduce and eleminate odors, but owing to the size of the Brandon Road Pool and the large sludge deposits therein and the continuing discharge into the Waterway of incompletely treated sewage, it is impossible to make a reasonably certain estimate of the amount of chlorine which would have to be applied to produce a substantial result.

"In order to have a reasonable prospect of substantially controlling offensive odors, it would be necessary to spend from $3,000 to $4,000 a day for chlorine, plus several hundred thousand dollars for chlorinating equipment.

"(d) Cascading the water at Lockport or sending it over the dam there would be remedial to the extent of producing some oxygen at Lockport. How much oxygen would be produced and how much of it would reach Joliet and the Brandon Road Pool is uncertain and could only be determined by actual trial. The use of the water in this way would cost the Sanitary District $1500 a day in the loss of power and it would

be necessary to use an undetermined amount of chlorine to prevent an odor at the point of cascading.

"(e) The supply of additional oxygen through production of nitrates by increase of air on the North Side and Calumet plants is not a feasible ameliorating suggestion for the summer of 1941. The evidence before me is not sufficient to prove that it is feasible for 1942, in view of the testimony of the Sanitary District experts that it would require an increase in aeration tank capacity. The proof before me is insufficient to support a conclusion that this suggestion, if it could be put into effect for the summer of 1942, would be substantially ameliorating.

"(f) Chemical treatment at the West Side plant would involve a very large permanent expenditure, which could not be made effective in 1941 and if it could be installed by 1942 would be almost immediately superseded by the activated sludge treatment which is provided for by the District's permanent program. This does not seem to me a feasible ameliorating measure.

"(g) The estimates as to cost of chlorinating West Side Imhoff tank effluents are too uncertain and the opinions of the experts too conflicting as to the extent of amelioration which it would afford, to enable me to make any finding that such chlorination is a feasible ameliorating measure.

"(h) It is feasible for the Sanitary District to budget the 1500 c. f. s. of water now permitted to be diverted in addition to domestic pumpage so as to divert only 1150 c. f. s. in the months of January, February, March, November and December, and to allocate the aggregate saving in diversion in those months to the summer months. This ameliorating measure will not, however, materially reduce the B.O.D. at Lockport, and will not, therefore, substantially relieve the odor nuisance.

"(i) The adoption of compulsory water metering by Chicago is an ameliorating measure, but the evidence before me is not sufficient to enable me to make any finding as to the extent of amelioration which it

would afford or the time within which it could be made available.

"(j) The provision of activated sludge treatment at the Southwest plant for the West Side Imhoff tank effluent is a very important and feasible ameliorating measure to which the Sanitary District, is committed, and toward which it has made some progress. The extent of the progress will depend upon the industry and enterprise of the Sanitary District. There is no prospect that this ameliorating measure will be operative in the summer of 1941. It is possible, but doubtful, that by special diligence it might be made operative in the summer of 1942 instead of only by the end of 1942, as claimed by the District.

"(k) As additional equipment is installed, it will become possible to give complete treatment during the course of 1941 and 1942 to increase quantities of sewage at the Southwest plant. The progress which will be made during these years and the gradually declining influence of sludge deposits from past years will be operative in the summer of 1941 to improve conditions at Lockport and Joliet as compared with 1939 and 1940, and will be operative to a further extent in 1942. The extent of relief from offensive odors which will be afforded at Lockport and Joliet in the summer months of 1941 is very doubtful, but there is a better outlook for the summer months of 1942. Weather conditions will have an important influence." (Report of Special Master Lemann, pp. 110-113.)

II. EXCEPTIONS TO THE REPORT OF THE SPECIAL MASTER.

The exceptions filed by the State of Illinois to the Report of the Special Master are very voluminous and many of such exceptions are duplications, some of said exceptions relating to findings of the Special Master on a particular point or to the failure of the Special Master to make the requested finding of Illinois on that point. Other exceptions are not material or relevant to the issues in-

volved on this reference and were apparently taken to clarify the record on particular points. Moreover it is apparent that many of the exceptions by Illinois will not be argued or discussed in its brief. An examination of all the exceptions taken and filed with this Court discloses that the proper treatment of these exceptions is to group them under the three issues of fact referred to the Special Master for summary inquiry.

(a) Exceptions to the Report of the Special Master filed by the State of Illinois.

The exceptions of the State of Illinois to the report of the Special Master, Hon. Monte M. Lemann, may be summarized and divided into the following classifications:

(1) The first group of exceptions by Illinois relate to the Special Master's conclusion as to the health conditions and to his recommendations thereon, or to the failure or refusal of the Special Master to grant certain findings of fact submitted by Illinois relating to health conditions. (See Illinois Exceptions I and II.)

(2) The second class of exceptions by Illinois relate to the Special Master's conclusions concerning present and past conditions at Lockport and Joliet, Illinois, or to the failure or refusal of the Special Master to grant certain findings submitted by Illinois relative to the actual condition of the Illinois Waterway. (See Illinois Exceptions III and IV inclusive.)

(3) The third type of exceptions relate to miscellaneous matters, including alleged mistakes in the record, failure to make requested findings relative to remedial measures, and the like. (See Illinois Exceptions VII.)

(4) The fourth class of exceptions by Illinois relate to the failure or refusal of the Special Master to recom-

mend an increase in diversion. (See Illinois Exceptions V and VI.)

(5) The fifth type of exceptions by Illinois relate to the failure of the Special Master to make or grant the recommendations for decree requested by Illinois and to the conclusion of the Special Master recommending that the petition and modified petition of Illinois be dismissed with costs against the State of Illinois. (See Illinois Exceptions VIII and IX.)

(b) Exceptions of the States of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to the Report of the Special Master.

The exceptions as filed by the opposing Great Lakes States to the report of the Special Master relate principally to his failure to find that each and every remedial or ameliorating measure suggested by the said opposing Great Lakes States would be feasible. It should be pointed out, however, that the questions raised in connection with the opposing Great Lakes States' exceptions arise only in the event that it should be held by this Court that an actual menace to the health of the inhabitants of the complaining communities exists. We feel confident that this Court will sustain the finding of the Special Master that no menace to health exists and that the recommendation of the Special Master that the petition and modified petition of Illinois be dismissed will be sustained. Therefore, it will be unnecessary for the Court to consider the arguments on the remedial or ameliorating measures.

As we pointed out in the foreword to the exceptions of the opposing Great Lakes States, said exceptions were taken solely for the purpose of placing on the record the position of the opposing Great Lakes States with respect to the feasibility of ameliorating measures in order to preserve their right to such finding if, at any time, an

issue is presented in the future in which those matters become important.

The exceptions filed by the opposing Great Lakes States to the report of the Special Master relate (1) to his failure to make findings that each and every one of the suggested ameliorating or remedial measures would be feasible and available to the State of Illinois without increase in diversion from Lake Michigan, and (2) to the failure of the Special Master to make a finding that the actual condition of the Illinois Waterway at Joliet and Lockport will result in no nuisance conditions with respect to odors during the summer months of 1941, and (3) to the failure of the Special Master to find that the flow through the Chicago Drainage Canal is manipulated for power purposes.

The argument of the opposing Great Lakes States in support of their exceptions to the Report of the Special Master appears in the appendix to this brief.

PART THREE

A. DATA CONCERNING THE COMPLAINING COMMUNITIES.

I. JOLIET AND LOCKPORT, ILLINOIS, THEIR LOCATION, SOURCE OF WATER SUPPLY, SEWAGE DISPOSAL, SIZE, POPULATION, INDUSTRIES, AND LIKE DATA.

(a) Joliet, Illinois.*

Joliet, Illinois, a city covering approximately five square miles of land (Illinois Exhibits 2, 38 R. 6, 289), is located about 40 miles, by railroad, southwest of Chicago, Illinois, on the Illinois Waterway (Illinois Exhibits 1, 2, 3, 4, R. 6-7). The population of Joliet in 1930 was 42,993, while the 1940 census showed a slight decrease in population, with a total of 41,936 people in Joliet (Pearse, Cross-Examination, Exhibit 5B). The health commissioner of the City of Joliet, Dr. Louis J. Frederick, estimated the total number of people living in Joliet and the surrounding territory who were likely to be affected by health conditions in and near Joliet, at 50,000 (Frederick, R. 459).

Joliet has within its borders many diversified industries, including seven big wallpaper mills, three plants of the American Steel and Wire Company, the Ruberoid Company, General Refractories and chemical plants (Jones, R. 229).

Joliet is a busy railroad center and many leading railroads pass through Joliet, including the Chicago, Milwau-

*The Joint Abstract of record herein consists of two parts; the first volume the Joint Abstract of record contains the testimony of the witnesses and will be hereinafter referred to as follows: JA-I, while the second volume of the Joint Abstract of record consists of the exhibits and will be hereinafter referred to as JA-II.

kee, St. Paul and Pacific, the Atchison, Topeka and Santa Fe, the Michigan Central, the Elgin, Joliet and Eastern, the Chicago and Alton, and the Chicago, Rock Island and Pacific Railroad (Illinois Exhibit 38, R. 289).

The domestic water supply of Joliet is not obtained from the Illinois Waterway but such water is taken from deep wells located in various parts of the city, one on Jasper Street, East Washington Street, Ruby Street, Williamson Street and Ottawa Street (Testim., R. 1368-1369; Jones, R. 295, JA-I, 570). Joliet has no sewage treatment plant and the raw sewage of Joliet is dumped into the Illinois Waterway below the city of Joliet (Testim., R. 1369, JA-I, 695; Jones, 294-295, JA-I, 570). The raw, untreated sewage of the Chicago area, since the reversal of the Chicago River in 1900, has always flowed through the city of Joliet (Jones, R. 296, JA-I, 570).

Two state prisons are located near the Illinois Waterway at Joliet, Illinois. The population of such prisons is as follows: The total population at the old Penitentiary is 2,029, while the total population at Stateville is 4,396, which includes, in both institutions, both inmates and employees. The total population at both the old prison and Stateville is 6,425. (Pearse, Cross-Examination, Exhibit 6; R. 3318). The raw, untreated sewage of these state prisons is dumped into the Illinois Waterway at the Brandon Road Pool (Pearse, R. 2555-2558, JA-I, 162-163).

(b) Lockport, Illinois.

Lockport, Illinois, is a small community covering about 1 square mile of territory, located about 3 miles northeast of Joliet, Illinois, and 37 miles southwest of Chicago on the Chicago Drainage Canal section of the Illinois Waterway (Illinois Exhibits 1, 2, 3 and 4, R. 6-7). The population of Lockport, Illinois, in 1930 was 3,383, while in 1940,

the population was 3,433. (Pearse, Cross-Examination, Exhibit 5-B, R. 3315). Lockport and other nearby communities, namely, Justice, Lemong, Romeo, Argo-Summit, Sag and Willow Springs, have no sewage treatment plants (Cheadle, R. 435-6; JA-I, 586; Pearse, R. 1656, JA-I, 124-5, 2556, JA-I, 162-163). The raw untreated sewage of these communities finds its way into the canal section of the Illinois Waterway (Pearse, R. 1656, 2556, JA-I, 162-3; Cheadle, R. 435-437, JA-I, 586). Lockport, and other nearby communities, namely, Justice, Lemong, Romeo, Sag and Willow Springs and Argo-Summit do not obtain their domestic water supply from the Illinois Waterway and all of such communities take their domestic water from deep wells, except Argo which obtains its water supply from the City of Chicago. (Cheadle, R. 437, JA-I, 586).

PART FOUR.

A. THE FACTS.

I. WITH RESPECT TO THE ACTUAL CONDITIONS OF THE ILLINOIS WATERWAY BY REASON OF THE INTRODUCTION OF UNTREATED SEWAGE.

(a) The record conclusively establishes that "the actual condition of the Illinois Waterway as the result of receiving untreated sewage" while never wholly satisfactory, has not in the past resulted in or caused any nuisance condition affecting public health and that the actual condition today is not such as to cause or result in any nuisance condition affecting health, and no increase in diversion of water from Lake Michigan, though temporary in nature, is necessary to protect the interests of public health.

1. *The conditions which have obtained in the Illinois Waterway since the opening of the Chicago Drainage Canal on January 17, 1900, have never been wholly satisfactory by reason of the fact that the Illinois Waterway has been the main receptacle of the sewage of the Chicago Metropolitan area and since an early date has received huge quantities of raw untreated or partially treated domestic sewage and industrial wastes, resulting in the pollution of said Waterway; nevertheless, although the actual condition of the Illinois Waterway has never been ideal it has not, at any time, caused or resulted in any nuisance condition affecting health.*

As the Special Master rightly says:

> "In considering the weight to be given to the claims of Illinois that the situation in Joliet and Lockport presents a menace to health which makes imperative an increase in the diversion, it seems pertinent to consider the situation which has prevailed in past years" (Report of Special Master Lemann, pp. 47-48).

It is agreed by almost everyone that even before 1939, conditions in the Illinois Waterway were never wholly satisfactory due to the discharge therein of the untreated sewage of Chicago (Report of Special Master Lemann, pp. 48-49). In the earlier years the Chicago River and the old Illinois and Michigan Canal and, since the opening of the Chicago Drainage Canal on January 17, 1900, the Main Channel and the DesPlaines and Illinois Rivers have been the main receptacles of the sewage of the entire Chicago Metropolitan area (Report of Special Master Hughes (1927), pp. 6-7; Report of Special Master Lemann, pp. 48-49).

Witnesses who were familiar with the Illinois Waterway in the past testified that the condition of said Waterway for a great many years was never wholly satisfactory because of the large quantities of raw, untreated or partially treated, sewage which were deposited therein to be carried away downstream (Cheadle, R. 424, 434-435, JA-I, 585-586; Mohlman, R. 281, JA-I, 204; Pearse, R. 211-212, JA-I, 104; Andrew, R. 3798-3801, JA-I, 261-262; Sontag, R. 397-398, JA-I, 581; Callahan, R. 861-862, JA-I, 633; Kerr, R. 2351-2383, JA-I, 711-717; Moore, R. 2332-2342, JA-I, 707-709; Detweiller, R. 2344-2348, JA-I, 709-711; Goodell, R. 2385-2410, JA-I, 718-724).

Dr. Mohlman, a witness called by the State of Illinois, who is in charge of all of the laboratories for the Sanitary District of Chicago, testified that conditions even before January, 1939, were never wholly satisfactory if one measured the condition of the Waterway by the amount of dissolved oxygen available and the biochemical oxygen demand of the water (R. 281, JA-I, 204).

Mr. Pearse, Chief Sanitary Engineer for the Sanitary District of Chicago, testified that there has always been a heavy deposit of sludge above the old power house at Lockport and that up to the year 1929 they measured 6 to 8 feet

of sludge deposits above the power house racks (R. 211, JA-I, 104). He testified further that they have always had some sludge deposits in the Brandon Road Pool and that such deposits started to form as soon as the gates were closed in the Brandon Road Dam when the Waterway was opened in the year 1933, and that sludge deposits were noticed during the first year when the dam was closed (R. 211-212, JA-I, 104).

The Special Master in his report refers to testimony by Pearse in previous hearings (1926-1927) in which Pearse affirmed that the Canal and River constituted a nuisance for a number of years and that odors from the Waterway could be smelled for a distance of half a mile. (Report of Special Master Lemann, p. 49.)

Bruce Cheadle, a witness for the State of Illinois, who is Secretary of the Chamber of Commerce in Lockport and also Secretary of the DesPlaines Valley Improvement Association and who has observed the deep Waterway for a great many years testified that the Chicago Drainage Canal has been a source of complaint in the DesPlaines Valley prior to the year 1939 and that they have always objected to its being a cess pool for the City of Chicago or any other territory (R. 424, JA-I, 585-586). Mr. Cheadle further testified that there has always been some odor emanating from the Canal and that there have been complaints for a great many years back about the condition of the Canal (R. 434-435, JA-I, 586).

The State of Illinois, Exhibit 37A (R. 4480, JA-II, p. 35) shows that since the year 1925, through the year 1938, during every summer, the dissolved oxygen has gone down to zero for a few months. Dr. Mohlman confirmed this fact in his direct testimony (R. 272, JA-I, 200).

Other witnesses familiar with the condition of the Illinois Waterway over a period of years, likewise testified

that prior to the year 1939 the sanitary conditions of such Waterway have not been wholly satisfactory (Sontag, R. 397-398, JA-I, 581; Andrew, R. 3798, JA-I, 261; Hollis, R. 1329, JA-I, 689).

Edward P. Callahan, United States Lock Master at Lockport (R. 859-860, JA-I, 633) testified that he had been lock master there since the 1st of May, 1932, and that he came to Lockport to paint the towers in the year 1930 for the United States Government. He said:

> "At that time the water out there was thick, you could almost paint with it. * * * You could almost paint with that water then. It was thick. And it was filthy, plenty. Then there was an awful stench. We almost had to get clothes pins and put on our nose. * * * That is when we first came here. * * * They (conditions) are nowhere near as bad today as they were then. They have been clearing that water up, cleared up at least, I would guess, 60 per cent. * * *" (R. 861-862, JA-I, 633).

Mr. Callahan testified further that conditions today (1940) were better than conditions a year ago and that smelling the water had not affected his health (R. 862, JA-I, 633).

Mr. Andrew of the United States District Engineer's Office in testifying with respect to conditions along the Illinois Waterway during the years 1924 and 1925 stated that in 1924 and 1925 "the odors in the City of Joliet at that time were very offensive." Andrew further stated that conditions in Joliet in 1925 were as bad as in 1939 (R. 3799-3800, JA-I, 261).

Even with the large quantities of water which have been abstracted from the Great Lakes-St. Lawrence Watershed during the period prior to the year 1939, due to the huge quantities of raw sewage or partially treated sewage which were deposited in such Waterway, conditions along the

Illinois Waterway were never satisfactory, especially during the years from 1925 to about 1930 when the water was very unsightly and thick and the odors extremely offensive and conditions were very bad (Andrew, R. 3798-3801, JA-I, 261; Callahan, R. 861-2, JA-I, 633).

2. *The conditions which obtained in the Illinois Waterway during the year 1939 were not satisfactory by reason of the default of the Sanitary District of Chicago in failing to provide the necessary facilities for complete treatment of all of the sewage of the District by December 31, 1938, the date of the final reduction in illegal diversion to 1500 c.f.s. became effective.*

The conditions which obtained in the Illinois Waterway at Lockport and Joliet during the year 1939 were worse than they had been during the year 1938. Those conditions, however, arose and were created solely by the default of the State of Illinois and the Sanitary District of Chicago in the performance of their duty under the Decree of April 21, 1930 (281 U. S. 696) as enlarged by the Decree of May 22, 1933 (289 U. S. 710). By the terms of the Decree of April 21, 1930, as enlarged, it was the duty of the State of Illinois and the Sanitary District of Chicago to provide by December 31, 1938, complete treatment of all of the sewage of the Sanitary District of Chicago through suitable and adequate works which would provide 85% or 90%, or more, purification of all the raw sewage of said District.

In fact on December 31, 1938, the Sanitary District of Chicago had only provided treatment of varying degrees for part of the sewage of the Sanitary District and such partial and incomplete treatment provided only 37.7% purification of the sewage of the said District (Final Report of Sanitary District, filed Jan. 1, 1939, pp. 11, 13).

The testimony of the 127 witnesses at the Joliet hearings the week of July 22, 1940, was mainly to the effect that

during the warm months of 1939 conditions along the Illinois Waterway were unsatisfactory due to offensive odors which from time to time annoyed the residents and inhabitants of Joliet and Lockport. Many witnesses testified that conditions on the Illinois Waterway in 1939 were worse than they had been prior to that time. (Sampson, R. 308, JA-I, 571; Jones, R. 291, JA-I, 569; Sontag, R. 395, JA-I, 581; Castello, R. 678, JA-I, 614; Britz, R. 689, JA-I, 616; Kerwin, R. 694, JA-I, 616).

There were many complaints about the odors which emanated from the Canal and Waterway during the warm months of 1939. Several witnesses stated that the physical appearance of the Waterway in 1939 was much worse than it was in previous years or in 1940. (Cheadle, R. 425, 433-539, JA-I, 585-586; Jones, 291-292, JA-I, 569; Sampson, R. 308-309, JA-I, 578).

On the other hand, one witness was of the opinion that the Illinois Waterway was better in 1939 than in 1938 (Santini, R. 685, JA-I, 615); and another witness, the U.S. Lock Master at Lockport was positive the condition of the Waterway in 1939 was much better than in the years 1930 or 1932 (Callahan, R. 681-682, JA-I, 633).

Mr. Callahan, United States Lock Master at Lockport, testified that in 1930 and 1932 the water was so thick you could almost paint with it and it was filthy with an awful stench so that they almost had to get clothes pins to put on their noses (R. 681-682, JA-I, 633). Callahan estimated that the river had cleared up at least 60 per cent since 1930 or 1932 (R. 862, JA-I, 633).

It will be seen from an examination of the record that there is no agreement among the witnesses as to the actual condition of the Waterway in the year 1939, except the general agreement that conditions were not ideal and annoying to some persons who resided near the Waterway.

Turning now to an examination of the exhibits prepared by witnesses Howson, Pearse and Mohlman to show the comparative pollution loads in the Chicago Drainage Canal during the years 1938 to 1942, we find that while the pollution load was less in 1939 than in 1938, owing to the failure of the Sanitary District to provide complete treatment for all the sewage of the District, coupled with the reduction in diversion on December 31, 1938, from 5000 c.f.s. to 1500 c.f.s. resulted in unsatisfactory sanitary condition in the Illinois Waterway (Opponents' Exhibit 14, R. 3030, JA-II, 107, Illinois Exhibit 61, R. 3529, Mohlman Exhibit 13-a, R. 3304). Other exhibits recording the degree and amount of treatment of the sewage of the Sanitary District of Chicago, the amount of sludge removed from the sewage, the huge amount of sludge removed from sewage deposited in the Main Channel of the Canal, the B.O.D. in the Canal, the D. O. in the Canal water, likewise show that during the summer of 1939, conditions in the Illinois Waterway at Lockport and Joliet were less satisfactory than in the year 1938 (Report of Special Master Lemann, tables 2, 3, 4, 5, 6, 7, 8, 9, pp. 117-122; see also: Illinois' Exhibits: No. 24A, R. 3636; 25A, R. 3638; 26A, R. 3640; 27A, R. 3642, JA-II, 28; 28A, R. 3644, JA-II, 29; 29A, R. 3646, JA-II, 30; 47A, R. 3654, JA-II, 47; 50A, R. 3658; 51A, R. 3660; 52A, R. 3662; 54A, R. 3664; 60, R. 3528; 37, R. 271). The B.O.D. in the Canal water at Lockport during the summer months of 1939 was 30.2 p.p.m. as compared to 17.3 p.p.m. of B.O.D. during the summer months of 1938 (Illinois' Exhibit 61, R. 3529). The D. O. in the Canal at Lockport was zero for many months in 1939 as compared to zero dissolved oxygen in the Main Channel at Lockport for several summer months in 1938 (Illinois' Exhibit 37, JA-II, 35). Thus, conditions in the Illinois Waterway at Lockport and Joliet were worse in the summer of 1939 than in 1938 as measured by the B.O.D., the D. O. in the canal water, the amount and de-

gree of sewage treatment and the water available from Lake Michigan. However, though such condition of the Waterway in 1939 may have been annoying to some persons, yet no menace to health ever existed on or along the Illinois Waterway.

3. *The condition of the Illinois Waterway in 1940 was considerably improved over the condition which existed in 1939.*

By the spring of 1940 the Sanitary District of Chicago had in full operation the Southwest Treatment Plant and thereby kept out of the Drainage Canal a large pollution load which formerly went into the Canal. The increase in the degree of treatment of all of the sewage of the Sanitary District is graphically shown in table 2 of Special Master Lemann's report at page 117. (See also: Illinois' Exhibits 24A, R. 3636; 25A, R. 3638; 26A, R. 3640; 27A, R. 3642, JA-II, 28, 28A, R. 3644, JA-II, 29; 29A, R. 3646, JA-II, 30; 47A, R. 3654, JA-II, 47; 51A, R. 3660; 52A, R. 3662). It is clear from an examination of the reports of operations of the several treatment plants of the Sanitary District that by the summer of 1940 a very decided improvement in the Waterway was made as compared to the sanitary condition of the Illinois Waterway at Lockport and Joliet during the summer of 1939.

Thus, in 1939, the dry solids removed from the sewage by the Sanitary District of Chicago averaged 305.6 tons per day while in 1940 this was increased to 422.7 tons per day (Table 3, Report of Special Master Lemann, p. 117). The amount of sludge returned to the channels of the Sanitary District in 1939 was 53,970 tons, dry weight, while in 1940 the sludge returned to the Canal was reduced to 20,224 tons, dry weight (Table 5, Report of Special Master Lemann, p. 119, see also Illinois' Exhibits 50A, 51A, 52A, R. 3658, 3660, 3662). During the year 1939, a grand total of

670 m.g.d., yearly average, of sewage was treated in all of the treatment works of the Chicago Sanitary District, while in 1940 the amount of sewage treated was increased to 930 m.g.d. yearly average (Table 2, Report of Special Master Lemann, p. 117, Illinois' Exhibit 25A, R. 3638).

The improvement in conditions along the Illinois Waterway in the year 1940 at or near Lockport and Joliet was apparent to all who visited the Illinois Waterway at those points.

On July 8, 1940, the Master, counsel and others took a trip to Joliet by auto and examined the Brandon Road Pool from the Brandon Road Lock and Dam to the Lockport Lock and Dam by boat. Conditions along the pool and on the Waterway on that day while not ideal were not bad. There were few odors apparent and not a great deal of scum or debris apparent on the surface of the water. Certainly the Waterway on July 8, 1940, was vastly improved over the condition testified to by witnesses as having existed in the summer of 1939. This improvement was quite marked and conditions were satisfactory despite the fact that one employee, a lock man, who locks boats at the Brandon Road Lock, testified that on July 8, 1940, the odors "were extra strong because the weather warmed up." (Christman, R. 629). Despite the high temperatures (Opponents' Exhibit 18A, R. 3978), the Master and counsel had no cause for complaints concerning odors from the Waterway.

The witnesses who were called to testify at Joliet were for the most part of the opinion that conditions on the Illinois Waterway had improved considerably during the year 1940 as compared to conditions on such Waterway in the year 1939. (Jones, R. 289-306, JA-I, 569-570; Sampson, R. 307-314, JA-I, 571; Ray Powers, R. 314-318, JA-I, 572; Mrs. Marie Bush, R. 331-360, JA-I, 575, 576; Mary S. Wurtz, R. 377-389, JA-I, 578-579; Sontag, R. 389-400, JA-I, 580-581; Cheadle, R. 420, JA-I, 585; Dr. Lennon, R. 526-543,

JA-I, 598-599; Dr. Curtiss, R. 547-595, JA-I, 601-604; Thos. Calamaras, R. 609, JA-I, 606; Mrs. Vina Poole, R. 633-639, JA-I, 610; Velt, R. 1311, JA-I, 686; Himes, R. 1312, JA-I, 686).

On the other hand, there were some witnesses who were of the opinion that conditions were about the same in 1940 as in the year 1939 (Sister Ursuline, R. 1107, JA-I, 657; Sister Hilda, R. 1117, JA-I, 658; Chrzanowski, R. 1254, JA-I, 679; Pellino, R. 733-735, JA-I, 621), while several witnesses were of the opinion that conditions were somewhat worse at Joliet in 1940 than during the summer of 1939 (Boles, R. 1321, JA-I, 688; Faulkner, R. 935, JA-I, 640).

However, with but few exceptions the consensus of opinion among the Joliet witnesses was that the Illinois Waterway had improved materially during the year 1940. (Report of Special Master Lemann, p. 20.) This can be attributed, directly, of course, to the fact that the Southwest Side Treatment Plant was placed in partial operation in May, 1939, and in almost complete operation in the Fall of 1939 (Pearse, R. 169, 176-177, JA-I, 90-92). Since the completion of the Racine Avenue pumping station on March 20, 1940 (Ramey, R. 20, JA-I, 6), additional sewage is brought to the Southwest Plant for treatment. In the fall of 1940 the Kostner Avenue sewer was placed into operation (Pearse, R. 2739, JA-I, 177), and more sewage of the southwest area now receives treatment. The additional sewage from the Southwest Area which in 1940 received complete or partial treatment took a tremendous pollution load off of the Canal and assisted in creating improved conditions. The sanitary experts on both sides are in general agreed that there was a gradual and progressive improvement in the Waterway in 1940 over conditions in 1939 due to the operations of the Chicago Sanitary District Sewage Disposal Plants in treating more sewage of the

District from time to time and in keeping sludge from the Canal (Opponents' Exhibit 14, R. 3030, JA-II, 107; Illinois' Exhibit 61, R. 3529; Mohlman, R. 267; Mohlman Exhibit 13A, R. 3304; Illinois' Exhibit 24A, 25A, 26A, 27A, 28A, 29A, 37, 47A, 50A, 51A, 52A, 54A, 60A, R. 3636, 3638, 3640, 3642, JA-II, 28, 3644, JA-II, 29, 3646, JA-II, 30, 271, 3654, 3656, 3658, 3660, 3662, 3664, 3528).

On Wednesday, July 24, 1940, the Master accompanied by counsel at 7:30 P. M. embarked at Jackson Street bridge, Joliet, for an inspection trip of the Brandon Road Pool (R. 1088-1098, JA-I, 699-706). During the trip the Master made the following observations:

The Special Master's notes show that in this inspection trip he could detect an odor from time to time but only intermittently; it would last for a few seconds or a minute and then he would lose it for several minutes and then catch it again. While an odor was perceptible at times, it did not seem to the Master terrible or particularly bad at any time. He noted that it would not bother him very much, although it might bother others. Although he would not call it pleasant, it was not strong. It did not seem to be any worse at the wider section of the Pool than at other points. He did not observe any flies and had only one mosquito bite, although it was dusk. At times there was a good breeze which, at other times, died out. He saw a number of bubbles on the water, which he was told represented the operation of gas from sludge underneath the surface. At first he saw little scum. Then as the party proceeded on its way the Master saw along the walls a rather thick surface layer, which appeared to be scum and which contained pieces of wood, paper, miscellaneous debris and a good many grease spots, which might have been due to oil. This scum varied in extent. At one point the scum was 2 or 3 feet in width; at others perhaps 10 to 20 feet; it was usually on the side along the walls, but he

observed it also at points in the middle of the Waterway. Bubbles were apparent for the whole width of the Waterway. At one point he detected an oily odor.

The Master slept four nights at Joliet and was not troubled by odors. The only trouble he had in sleeping was due to the heat, which was so great that he kept an electric fan constantly going all night. The City Hall, in which the hearings were held, was on the east side of the Canal about three blocks away. He detected an odor on only one day and then only for a few minutes. The four days he spent in Joliet were the hottest of the summer, the temperature reaching 103 degrees on July 25th.

Illinois' Exhibit 61 (R. 3529) prepared by Pearse shows that the B.O.D. at Lockport in 1940 was 20.6 p.p.m. compared to 17.3 p.p.m. of B.O.D. at the same place in 1938 and 302 p.p.m. of B.O.D. in 1939. The pollution load of the Canal in 1940 was much less than in the year 1939 (Illinois' Exhibit 61, R. 3529; Mohlman Exhibit 13A, R. 3304; Opponents' Exhibit 14, R. 3030).

We submit that the testimony of the witnesses who observed the condition of the Illinois Waterway in 1940 and in other years, together with the record of improvement in treatment of the sewage of the Sanitary District of Chicago, the observations of the condition of the waterway made by the Master during the summer of 1940, the photographs of the Canal taken from the bridge on Highway 45 in 1940 (Opponents' Exhibits 8 and 16, R. 2762 and 3387) conclusively establish that the condition of the Illinois Waterway in 1940, while open to improvement, clearly was not such as to create any nuisance affecting public health, nor such as to constitute a menace to the health of the inhabitants of Lockport or Joliet. Howson, R. 1948, JA-I, 340; Ellms, 2326, JA-I, 472; Dr. Enzer, 2148-51, 2161-2165, JA-I, 538-547; Dr. Perkins, R. 2460, 2474, JA-I, 521, 526; Dr. Krumbiegel, R. 2180, 2190, JA-I,

554, 558; Observations of the Master, 855-857, 1088-1098, JA-I, 699-706; Dr. McNally, R. 2669, 2700, JA-I, 491, 501; Dr. Gute, R. 2209-2211, JA-I, 565; Dr. Nichols, R. 3132, JA-I, 510-511; Opponents' Exhibits 1, 4, 5, R. 1919A, 1931, 2123; Dr. Frederick, R. 464-465, JA-I, 589-590; Opponents' Exhibits No. 6, JA-II, 96; No. 7, JA-II, 98, No. 15, JA-II, 108-116; No. 23, JA-II, 117-121; No. 24, JA-II, 121).

4. *The actual condition of the Illinois Waterway today by reason of the introduction of untreated sewage is such as to result in no nuisance condition affecting health nor to constitute any menace to the health of the inhabitants of communities along the Illinois Waterway.*

(a) The condition of the Illinois Waterway has improved progressively since 1939 and today is better than in 1940 or in previous years.

The Sanitary experts of the opposing Great Lakes States and of the State of Illinois, are, in general, agreed that condition of the Illinois Waterway has improved progressively since the latter part of the year 1939 when the Southwest Side sewage treatment plant was substantially fully completed and began to operate substantially all of its units (Mohlman R. 267; Mohlman Exhibit 13A, R. 3304; Illinois' Exhibit 61, R. 3529; Opponents' Exhibit 14, R. 3030, JA-II, 107).

Mohlmann Exhibit 13A (R. 3304) shows that the pollution load of the Sanitary District Canal in 1941 will be only 33% of the pollution load in 1938. The pollution load of the Canal will be only 30% in 1941 of the pollution load in 1938 as shown by Exhibit 61 prepared by Pearse (R. 3529). The pollution load of the Sanitary Drainage Canal in 1941 will be only 26% of the pollution load of the Canal in 1938 according to Howson, as shown by Opponents' Exhibit 14 (R. 3030, JA-II, 107). The direct diversion of

water from Lake Michigan was reduced on December 31, 1938, from 5000 c.f.s plus domestic pumpage to 1500 cubic second feet plus domestic pumpage. However, the comparative improvement in the pollution load as testified to by Mohlman, Pearse and Howson indicate how much improved the Illinois Waterway is today even with the reduced diversion of 1500 c.f.s. over the condition of the Waterway in 1939 when the reduction in diversion first became effective or in 1938 when 5000 c.f.s. was abstracted from Lake Michigan.

The Comparative Improvement in Pollution Load of the Chicago Drainage Canal May Be Noted in the Following Table Based on the Testimony of Mohlman, Pearse and Howson

	1938	1939	1940	1941	Ultimate After West Side Activated Sludge Plant is Completed
Dr. Mohlman: Based on Exhibit No. 13-A (R. 3304) tons of volatile solids to canal	(123,100) 100%	(115,658) 94%	(76,472) 62%	(40,910) 33%	(18,720) 15%
Mr. Pearse: Based on Illinois Exhibit No. 61, R. 3529, 5-Day B. O.D. lbs. per day, including B. O.D. from old sludge, but no credit for improvement due to reaeration of canal surface	(630,800) 100%	(562,300) 89%	(386,000) 61%	(194,000) 30%	(33,000) 5%
5-day B.O.D. P.P.M. (Illinois' Exhibit 61, R. 3529)	17.3	30.2	20.6	10.3	
Mr. Howson: Based on Opponents' Exhibit 14, R. 3030, tons of B.O.D. to Canal	(645,000) 100%	(539,400) 84%	(421,050) 65%	(169,000) 26%	(100,000) 15%*
B.O.D. of sludge and canal reaeration assumed as offsetting each other and left out of figures.					

*Computed in ratio of 100,000 lbs. to 169,000 lbs. to 26% in 1941.

With respect to all figures of Dr. Mohlman, Mr. Pearse and Mr. Howson the pollution load for the year 1938 is taken as 100%, and the percentages in subsequent years reflect the pollution load in per cent of that present in 1938.

Illinois Exhibit 61 (R. 3529) shows that the B.O.D. in the Canal in 1941 will be only 10.3 p.p.m. as compared to 20.6 p.p.m. in 1940, or 30.2 p.p.m. in 1939, and 17.3 p.p.m. in 1938.

(b) In the year 1941, conditions in the Illinois Waterway with 1500 c.f.s. are and will be improved over conditions which obtained in the Illinois Waterway in 1938 with 5000 c.f.s.

After the foregoing exhibits had been introduced and after the Brief of the Respondent Great Lakes States was filed with the Special Master and served upon Illinois, the State of Illinois, at the New Orleans hearings, introduced what it called a corrected exhibit of former Illinois' Exhibit 61 which was marked and received as Illinois' Exhibit 61-A (R. 4033).

The revised figures submitted by witness Pearse indicate that according to their latest estimates the 5-day B.O.D. at Lockport during 1941 would be 361,500 pounds per day instead of 194,000 pounds per day as originally computed on Illinois' Exhibit 61 (Report of Special Master Lemann, p. 67). According to the revised figures appearing on Illinois Exhibit 61-A, the 5-day B.O.D. at Lockport in p.p.m. would be 21 instead of 10.3 as originally computed.

After Mr. Pearse had submitted his revised figures he testified,

> "that he would be disposed to again revise them so as to reduce to 346,000 the figure of 406,000 appearing in the 1941 and 1942 columns (as B.O.D. demands from current deposits of sludge and/or effluents) in order to give proper weight to probable decreases in B.O.D. from West Side and Southwest effluents." (Report of Special Master Lemann, p. 67).

Mr. Howson, Chief Sanitary witness for the Respondent Great Lakes States, challenged the accuracy of the revised figures introduced by the State of Illinois and asserted that conditions at Lockport in the summers of 1941 and 1942 will be materially better than claimed by Illinois. Mr. Howson contended that even upon the revised figures

appearing in the Illinois Exhibit 61-A, the B.O.D. at Lockport in the summer months of 1941 and 1942 should properly be determined by taking that proportion of the estimated sources of B.O.D. in those years which (1) the actual B.O.D. at Lockport in the earlier years was to (2) the total sources of B.O.D. in the earlier years. On this basis, even upon the revised figures, Mr. Howson asserts that the B.O.D. at Lockport in the summer months of 1941 will be 13.5 p.p.m. and 11.5 p.p.m. in 1942 instead of the revised estimates of 21 for 1941 and 17.6 for 1942, as estimated by Illinois (Report of Special Master Lemann, p. 68).

Mr. Howson originally computed that during the three summer months of 1941 and 1942, the B.O.D. at Lockport would be 7.3 p.p.m. and 4.8 p.p.m. (Report of Special Master Lemann, p. 68).

It is manifest from the foregoing that even on the basis of the revised figures introduced by the State of Illinois that in the year 1941 conditions in the Illinois Waterway at Lockport with 1500 c.f.s. will be materially improved during the summer months over conditions which obtained in the Illinois Waterway at Lockport in 1938 with 5,000 c.f.s., and that no nuisance conditions from odors will result anywhere along the Illinois Waterway during 1941 or 1942 or thereafter.

Illinois complains that the Special Master based his conclusion of present and past conditions at Lockport and Joliet on the memory of a certain few witnesses and not on an actual analysis of the water. This exception appears to the respondent Great Lakes States as frivolous and specious inasmuch as the water from the Canal and the Des Plaines and Illinois Rivers is not used for drinking, bathing or other domestic purposes and because analysis of the water will show neither the existence of nor the intensity of odors, if any. It is clear that the only way one could

determine the present and past conditions at Lockport and Joliet along the Waterway would be by the testimony of persons familiar with conditions as they now exist as compared to conditions as they have existed at those points in the past.

The witnesses upon whose testimony the Special Master relied in part, and whose testimony is attacked by Illinois as being inconsistent were both United States Government employees—one the U. S. Lockmaster at Lockport and the other the Principal Assistant Engineer of the War Department at Chicago, who had been familiar with the Illinois Waterway for a great many years. An examination of the record discloses that the testimony of Andrew (JA-I, 261) and Callahan (JA-I, 633) as to conditions in 1930 is not inconsistent in any particular, but on the other hand is thoroughly consistent. Andrew testified that conditions at Lockport in 1925 and in 1939 were the same and that conditions during the period from 1926 on up to the completion of the Brandon Road dam in 1933 were very bad because of the turbulent stretch of shallow river running through Joliet which caused the spray to be diffused into the air carrying with it the offensive odors of which complaint was made. It should also be noted, according to the testimony of both Callahan and Andrew that conditions began to clear up in the thirties, despite the fact that the progressive reduction in diversion of water from Lake Michigan under the decree became effective whereby on July 1, 1930 the direct diversion was reduced to 6500 c.s.f. and to 5000 c.s.f. on December 31, 1935. Of course, the reason for the improvement in conditions was due to the increased treatment of the sewage of Chicago by the Sanitary District.

At this point we might also comment briefly on the objection raised by Illinois to the evidence of certain witnesses from communities below Joliet along the Illinois Waterway.

The witnesses were Dr. Kerr and Messrs. Moore, Detweiller and Goodell, who testified concerning conditions today along the Illinois Waterway from Joliet to down below Peoria as compared with conditions in the past. These witnesses objected to any increased diversion by Illinois on the ground that it might bring more sewage down to Peoria and the communities below. Certainly these objectors have as much interest in and right to give their testimony on the question of increased diversion as the residents of Joliet and Lockport because of the effect which might be produced downstream if more water from Lake Michigan were authorized.

The fact that these objectors have complained about nuisance conditions created in the waters of the Illinois Waterway by the Sanitary District of Chicago for more than twenty years discloses the complete lack of equity of Illinois to now urge such complaints from Joliet and Lockport as a basis for obtaining more diversion at the expense of the respondent Great Lakes states and their citizens as well as to the detriment of the citizens of the State of Illinois residing in the lower Illinois River communites.

We submit that the record conclusively establishes that the inhabitants of Joliet and Lockport, Illinois, will not suffer any annoyance or inconvenience from odors from the Illinois Waterway during the summer months of 1941 or 1942 or thereafter.

5. *The request of Illinois for a controlled increased diversion of water from Lake Michigan during 1941 and 1942 in an amount sufficient to insure one part per million of dissolved oxygen in Brandon Road Pool is wholly without merit.*

In its so-called modified petition, referred to in its brief submitted to the Special Master, the State of Illinois suggests that Illinois should be granted a temporary controlled

increase in diversion of water from Lake Michigan for the years 1941 and 1942 to be measured by the amount of water necessary to produce one part per million of dissolved oxygen content in the water above the dam of Brandon Pool. Here Illinois again is setting up a high standard, one which it never has had in the past, to be obtained at the expense of the Great Lakes States and their peoples. An examination of exhibit 37-a, JA-II p. 35, indicates that during the period from the year 1925 to 1940 the dissolved oxygen in the water at Lockport during the summer months of each of such years has gone down to zero (Report of Special Master Lemann, p. 70). See also the testimony of Dr. Mohlman (R. 281, JA-I, 204). An examination of the table prepared by the Board of twenty-eight experts employed by the Sanitary District of Chicago and published by the Sanitary District in its document, entitled Vol. III Sewage Disposal, at page 45, discloses that from 1911 through 1924 for an average of 157 days of each of said years the dissolved oxygen content in the water at Lockport was below one part per million. The presence of any dissolved oxygen is sufficient to prevent nuisance and a minimum of 1 p.p.m. of dissolved oxygen is not necessary (Report of Special Master Lemann, p. 56).

Thus it will be seen that Illinois is asking for a standard it has never had in the past, one that is not necessary to prevent nuisance conditions in the Waterway. The suggestion that Illinois be granted a controlled increased diversion would be placing a premium or bonus on inefficiency. Under the suggested plan, the more inefficiently the sewage disposal plants of the Sanitary District of Chicago are operated, the greater the amount of diversion of water from Lake Michigan that could be obtained. Inasmuch as no menace to health exists along the Illinois Waterway at any point, no increase in the diversion of water from Lake Michigan is necessary. However, if the

court should hold that some increase in diversion is necessary, the suggested controlled temporary increase in diversion would be clearly objectionable from every standpoint. The past record of Illinois and the Sanitary District of Chicago certainly arouses no confidence in either their willingness or their ability to function and perform efficiently and speedily so as to restore to the respondent Great Lakes States and their peoples the rights, which have heretofore been adjudicated by this court, and of which Illinois and the Sanitary District have for so many years deprived them. As the Special Master points out, the record shows that the Sanitary District of Chicago has been influenced not by any desire to make speed but rather by the purpose to complete ultimately its sewage disposal program at as little expense as possible to its taxpayers (Report of Special Master Lemann, p. 107), and that every increased diversion from the Great Lakes removes a stimulus to Illinois to speed the work necessary to carry out the decree of the court of April 21, 1930 as amended (Report of Special Master Lemann, p. 109).

6. *The Ten-Day Flushing Test Resulted in a Very Decided Improvement of the Illinois Waterway from Chicago Through the Brandon Road Pool.*

Illinois complains that the ten-day experimental flushing test during the period December 2d to December 12, 1940 will increase the need at Brandon Pool for increased diversion of water in the summers of 1941 and 1942. The fact of the matter is the result of the experimental ten-day flushing test was that of the offensive material carried into the Pool by flushing, a larger percentage was carried out of the Pool than the total material taken into the Pool. In other words 52.8% of the tons of B.O.D. carried into the Pool were carried out of it. The flushing scoured out the Illinois Waterway through the Canal and above the Brandon Road Pool. This means that the Sanitary Drainage Canal above Lockport having been well scoured out

will permit the lake water to reach the Brandon Pool in much better condition so far as dissolved oxygen is concerned, than during previous years. Thus, despite the fact that much of the material swept down the Canal by the increased flow did not carry through the Pool, but was deposited therein, the entire Canal from Chicago to below the Brandon Road dam was improved by at least fifty per cent. Therefore, the water from Lake Michigan will have much more dissolved oxygen than in the past to neutralize the odors which might arise from the putrefactive material deposited in the Pool. The cleansing of the upper reaches of the Waterway will more than offset the disadvantage of the deposit in the Brandon Pool of the material which was brought down from the upper reaches by the increased flow during the ten days. (Report of Special Master Lemann, pages 78-82.)

7. *The Brandon Road dam creating the Pool was initiated and begun by the State of Illinois prior to 1930 and was completed by the Federal Government in 1933.*

Illinois complains that at the time of the decree of April 21, 1930 and of its enlargement May 22, 1933, the Court did not have before it any matter relating to Brandon Pool at the lower end of the City of Joliet. The fact is that the situation at Joliet through the construction of Brandon Pool was brought about by the State of Illinois itself through the planning and beginning of the construction of the dam near Brandon Bridge at Joliet, which replaced the former turbulent flow of the DesPlaines River and its great purifying capacity with a slack-water, stagnant pool. After the passage of the Act of Congress of July 3, 1930, which federalized the Illinois Waterway, the Federal Government took over and completed construction of the Brandon Road dam in 1933. The Federal Government merely carried out and completed the plans and ideas of the State of Illinois on this subject.

II. "WHETHER, AND TO WHAT EXTENT, IF ANY, THAT CONDITION (OF THE ILLINOIS WATERWAY) CONSTITUTES AN ACTUAL MENACE TO THE HEALTH OF THE INHABITANTS OF THE COMPLAINING COMMUNITIES."

(a) The record conclusively establishes that the actual condition of the Illinois Waterway by reason of the introduction of untreated sewage therein has not constituted and does not now constitute a menace to the health of the inhabitants of the complaining communities and no increase in the diversion of water from Lake Michigan, though temporary in nature, is necessary to protect the interests of public health.

1. *The Scope of the issues on the present reference.*

(a) Material allegations in the petition of the State of Illinois with respect to the alleged health problem.

The petition of the State of Illinois for temporary modification of the decree of April 21, 1930, which petition was filed with this Court on January 15, 1940, contains the following allegations with reference to the alleged effect of the condition of the Illinois Waterway on the health of persons living or working along said waterway. At pages 8 and 9 of the Illinois petition is the following pertinent paragraph, to-wit:

> "Subsequent to December 31, 1938, when the diversion of lake water was reduced to 1500 cubic feet per second there has been stagnation in the Sanitary District Canal and the Illinois Waterway. This stagnation has resulted in the formation of thick, black, bubbling scum for long distances along the Sanitary District Canal and the Illinois Waterway. Because of the effluent of sewage from the Sanitary District of Chicago into said Sanitary District Canal and the Illinois Waterway a putrescent, obnoxious, noisome and unhealthful odor exists, causing nausea, insomnia, loss of appetite, irritation of the mucous membrane of

the nose and throat and in general the undermining of the health of those persons living or working along the Sanitary District Canal and the Illinois Waterway. This condition aggravates illness and retards the recovery of patients ill in hospitals located along said Sanitary District Canal and the Illinois Waterway."

(b) The order of reference, dated April 3, 1940.

The order of this Court of April 3, 1940 referred the causes herein to Special Master Lemann for summary inquiry with reference to three issues of fact, among them the question whether and to what extent, if any, the *actual* condition of the Illinois Waterway constitutes an *actual* menace to the health of the inhabitants of the complaining communities (309 U. S. 636).

"Actual" is defined in Webster's New International Dictionary (second edition) as follows:

> "Exist in act or reality; really acted or acting; in fact; real *opposed* to potential, possible, ostensible, virtual, speculative, conceivable, ideal, theoretical, hypothetical or nominal."

"Menace" is defined as follows:

> "Projecting, threatening. The show of an intention to inflict evil; a threat; indication of probable evil or catastrophe to come."

Dr. Norbert Enzer, a witness for the opposing Lake States, defined "Menace to health" as follows: (R. 2156-7, JA-I, 542)

> "I would use the word 'menace' with respect to health as applied to something which was actively a menace. In other words, it would produce deleterious effects to health to a sufficiently large number of people who came in contact with it so that one could say that it eliminated the accidental factor of some particular or peculiar individual's susceptibility."

Professor Andrew C. Ivy, a witness for the State of Illinois, in stating why he thought the Waterway constitutes an actual menace to health said:

> "We abate smoke, we abate noise, we abate dust, we try to abate pollen distribution because of hay fever sufferers; we abate stray dogs because of threat of rabies and the spread of disease by stray dogs, and when a water supply is threatened with pollution, there is any question that the water supply might be polluted, we immediately take steps to take care of the situation, and it is on the basis of generalizations and principles of that sort that I believe there is an actual menace to health existing there now." (R. 3037, JA-I, 307.)

In the above quoted definitions may be found the conflicting theories of the State of Illinois and the opposing Great Lakes States with reference to the issue concerning the health of the inhabitants of the complaining communities.

It is the contention of the opposing Great Lakes States that the phrase "actual menace to health" as used in the order of this Court means that the effects on the health of the people residing near the Waterway must be real and exist in fact, as opposed to any potential, speculative, hypothetical views on what might happen, unsupported by any real cases or actual happenings. On the other hand, it is the theory of the medical experts called by the State of Illinois that an actual menace to health may be shown by mere speculative and theoretical guesses as to what might possibly happen in the future, unsupported by any actual happenings in the past, and based upon generalizations that smoke, dust, odors, noises, carbon monoxide gases from automobiles on the streets, and the like, are all harmful to the human system and should be abated. In addition, Illinois contends that the test is the effect of the Waterway upon invalids and persons of less than average

health rather than the effect upon persons of normal health. With this view, the opposing Lake States earnestly disagree.

2. *The record conclusively establishes that the evidence introduced by Illinois concerning the alleged effect of the Illinois Waterway on the health of the residents of Joliet and Lockport falls far short of establishing a menace to the health of the people of those communities and at the most shows only annoyance, discomfort and inconvenience suffered by some people, chiefly during the summer of 1939.*

During the hearings held at Joliet, Illinois, the week of July 22, 1940, a total of 127 witnesses testified before the Special Master (Report of Special Master Lemann, 12). The general trend of the testimony by the lay witnesses and doctors related to the personal experiences of the witnesses during the summers of 1939 and 1940, although some of the witnesses also testified as to the experiences of members of their family, while several school teachers testified with respect to the health of the children under their care.

A summary of the testimony discloses that during the year 1939 odors from the Illinois Waterway at most annoyed certain witnesses, or annoyed members of their families or children under their care, and that such odors were worse in 1939 than in previous years. Most of the witnesses are agreed that the odors in 1940 were not nearly as bad as the odors in 1939.

Many of the witnesses complained of having suffered nausea or insomnia, or loss of appetite in 1939 or 1940 and some witnesses also testified concerning impetigo and sinus trouble. There was also some testimony of the effect of the proximity of the Illinois Waterway on the health of patients in St. Joseph's Hospital at Joliet, Illinois.

We submit that a reading of the record discloses that all of the symptoms and complaints alleged to have been suffered by residents of Joliet and Lockport during 1939 and 1940 are trivial in character, transient and inconsequential, and could have been due to numerous other causes rather than to the Waterway.

3. *The evidence with respect to complaints concerning neusea establishes that since nausea may result from numerous causes it is speculative that the Illinois Waterway is responsible for any of the cases of nausea herein complained of.*

Dr. Thomas H. Wagner defined nausea as a "sick stomach" (R. 887, JA-I, 636). He stated that was as near as he could get to it. When Dr. Wagner was asked to name the common causes of nausea, he answered: "Oh, my gosh, that would take me an hour" (R. 887, JA-I, 636). He was then questioned as follows:

Q. "There are so many causes, then, it would take you an hour to name them?"

and he answered:

A. "Certainly, many causes of it."

It seems elementary that since there are many common causes for nausea it is often impossible to determine just which cause is responsible for the symptoms complained of. One witness, J. G. Nichols, in testifying that his wife became nauseated and suffered from loss of sleep and loss of appetite in 1939, frankly stated that those things hadn't happened this year (1940) and that his wife had been nauseated but he thought it was on account of the heat (R. 1302, JA-I, 684).

Of the 127 witnesses who testified at the Joliet hearings, about 34 per cent testified that they personally had been nauseated either in 1939 or 1940, while about 22

per cent of such witnesses testified that members of their families, patients, or school children in their care suffered from nausea, either in 1939 or 1940.

Many of the witnesses who testified that they personally suffered from nausea or that members of their family suffered from nausea during 1939 or 1940 were of the opinion that the odors from the Illinois Waterway were responsible for this condition. Dr. Wagner, a physician practicing in Joliet, testified for Illinois that all individuals would not be susceptible to odors from the Illinois Waterway, it would depend entirely upon the individual. In the words of Dr. Wagner a normal individual in the presence of this odor would not necessarily become nauseated.

> "It depends whether he is susceptible to that odor. As I said before some people are susceptible to the odor of a rose, which is supposed to be a perfume. They become nauseated and sick, the same way people become nauseated from the odor from the canal or from gas or anything" (R. 896, JA-I, 637-638).

In other words, the average individual would not be susceptible to odors from the Canal, but only the sensitive, susceptible person might be annoyed by certain odors whether they came from a polluted Waterway or from a rose.

Dr. Wagner testified further that an individual could become accustomed to odors emanating from the Canal, that is, "you can become accustomed to almost anything if you live with it long enough" (R. 894). Surely, the Illinois Waterway with its 40 year record of sewage pollution should have allowed residents of Joliet ample time to become accustomed to odors from the Waterway. Dr. Norbert Enzer, a witness called by the opposing Great Lakes States, testified on this point as follows:

> "I might say with respect to odors that they can be annoying; they can be a source of discomfort;

they can produce even symptoms on occasion, but they are transient, they are effunescent, they don't cause a disease, they don't undermine health, and, as a general rule, people who are constantly exposed to the same odors rapidly became adjusted to them so they very soon become less conscious of it and finally do not notice it at all'' (R. 2151, JA-I, 540).

It should be noted that the number of people who actually testified to having suffered from nausea in 1939 or 1940 were and are but a very small percentage of the total number of witnesses at Joliet and a very small percentage of the total population of the communities of Joliet and Lockport combined (total population of about 50,000) and a still smaller percentage of the 150,000 people within the trading area of Joliet. Nausea is a common symptom in our modern life and one not associated solely with sewage pollution or waterways. It would be highly speculative to say that every case of nausea testified to at the Joliet hearings was directly caused by odors from the Waterway Even the witnesses don't all go that far in their claims. With numerous causes of nausea, it is probable that most of the complaints were due in part or wholly to causes not connected with the Waterway. Finally, nausea does not undermine the health and is in general inconsequential and transient, and certainly not a menace to health as the physician understands it (Dr. Enzer, R. 2168, JA-I, 548; Dr. Perkins, R. 2483, JA-I, 528).

4. *The inability to find sleep easily during the summers of 1939 and 1940 could have been due to the heat or other causes not connected with the Illinois Waterway.*

Some witnesses at the Joliet hearings testified concerning loss of sleep or the difficulty of going to sleep. About 46 per cent of the witnesses who testified at Joliet stated that during the summer months of 1939 or 1940 they had some complaint to offer with respect to their ability to

go to sleep or to loss of sleep suffered by them. About 22 per cent of the witnesses at Joliet described the difficulty that members of their family had in going to sleep or concerning the loss of sleep suffered by members of their family. Other witnesses testified they were not affected in this way at all. One witness was frank to admit that last night "the heat was keeping me awake more than anything" (Sherman, R. 823, JA-I, 628).

The Special Master was not troubled at night at Joliet by odors and the only trouble he had in sleeping was due to the heat, which was so great that he kept an electric fan constantly going all night (Report of Special Master Lemann, p. 29). The four days the Master spent in Joliet were the hottest of the summer of 1940, the temperature reaching 103 degrees on July 25th.

Sherman testified on Tuesday, July 23, 1940. The maximum temperature on that date was 97 degrees, while the maximum temperature on July 22, 1940 was 94 degrees (Opponents' Exhibit 18, R. 3391).

Concerning the effect of loss of sleep upon the health of a person, Dr. Norbert Enzer, on cross examination, testified as follows:

> "I can conceive, for example, that the loss of sleep that is going on in London now might affect some of the people there in an unfavorable manner, but loss of sleep as an incident, I don't think, contributes to ill health, and if the thing that produces the loss of sleep at the time we sleep is normally expected is continued over a long period of time, the normal individual will readjust himself and find his sleep at other times" (R. 2172, JA-I, 550).

The Court will take judicial notice of the fact that even the normal, healthy individual suffers from inability to sleep due to heat, worry, fatigue, overwork, concentration on work, indigestion, and the like, and that it would

be very difficult to say with reasonable assurance just what caused a particular individual to lose sleep or to have difficulty in going to sleep. Moreover it is common knowledge that almost everyone has at times suffered from inability to find sleep easily. Lack of sleep or inability to find sleep easily constitutes no menace to health. Every person has at one time or another had difficulty in finding sleep due to worry, illness, upset stomach, the heat, or the like. In fact, it is common knowledge that one of the principal causes of inability to find sleep during the summer months is the heat. It is clear that every case of inability to sleep at Joliet and Lockport in 1939 and 1940 was not due solely to the Waterway. It would be speculative to say that it was. The Court will take judicial notice that the drug stores throughout this country today sell large quantities of sleeping drugs and potions to induce sleep for those persons who are unable to find sleep easily. Insomnia or sleeplessness was known to the people of Joliet and Lockport long before the final cut in diversion was made on December 31, 1938.

We submit that insomnia or inability to find sleep easily does not undermine health, is a complaint universally noted everywhere, and is not a menace to health, at least not as testified to in these causes.

5. *Loss of appetite may result from so many causes that it is speculative and conjectural to say that the proximity of the Illinois Waterway is in any way responsible for such complaints at Joliet.*

About 22 per cent of the witnesses who testified at the Joliet hearings stated they suffered from loss of appetite during the summer months of 1939 or 1940. About 22 per cent of the witnesses at Joliet testified that members of their family suffered from loss of appetite. Loss of appetite is not rare and may be due to numerous causes (Ivy, R. 3072-3073, JA-I, 324).

At the outset, the attention of the Court is invited to the fact that, with one or two exceptions, all the people who testified at the Joliet hearings appeared to be very healthy and many of such witnesses seemed to tend to overweight. With but one or two exceptions there was no testimony that any one of the witnesses were compelled to give up even a day's work due to loss of appetite, nausea or loss of sleep.

Approximately 78 per cent of the witnesses testified that they did not suffer from any loss of appetite or didn't mention anything about loss of appetite. In fact, the witnesses who were asked directly concerning their health either testified it was fine (Koehl, R. 1308, JA-I, 685) or that their health was all right (Marietta, R. 755, JA-I, 623) or that they were immune to those things (Nichols, R. 1302, JA-I, 684) or that they couldn't blame their health on the river (Swanco, R. 751, JA-I, 623).

Dr. Wagner when he was asked whether Joliet is generally a pretty healthy community, replied: "Well, I believe so, yes; as good as the average" (R. 893, JA-I, 637). Dr. Wagner was then asked the following question by the Special Master:

> Q. "One of the questions that the Supreme Court will have to decide is where does something become a menace to health as distinguished from annoyance, unpleasantness, disagreeableness or lack of enjoyment. Would you say that this condition here is a menace to health?"

Dr. Wagner replied:

> A. "Well, to the average healthy individual I must honestly state that I don't believe it is a menace to the health of the average healthy individual * * * (R. 892, JA-I, 637).

It should also be noted that the witnesses who testified at the Joliet hearings were all average normal, healthy

individuals, as could be noted by their appearance and as was disclosed by their testimony. Most of such witnesses resided in Joliet which was described by Dr. Frederick, City Health Commissioner, as a healthy community (R. 464, JA-I, 589). From the physical appearance of these witnesses any temporary and slight loss of appetite certainly had no effect on their weight or appearance, even if we assume for purposes of argument that the Waterway caused the loss of appetite. In any event occasional loss of appetite is not a serious matter. In fact a little loss of appetite would be beneficial rather than detrimental for most people. It is highly speculative to say that the cases of loss of appetite testified to at Joliet were caused by odors from the Canal rather than from indigestion, worry, the heat or some other cause.

6. *There is no direct proof that the condition of the Illinois Waterway is responsible for any actual case of retarding the recovery of patients at St. Joseph's Hospital or elsewhere.*

Some of the doctors called by the petitioner, State of Illinois, testified that the odors from the Illinois Waterway might have the effect of prolonging the time of the recovery of patients in hospitals adjacent to the Illinois Waterway. Dr. Wagner testified that while he thought the conditions along the Illinois Waterway did not constitute a menace to the health of the average healthy individual, it would be a menace to the health of the individual ill from other causes or who is not strong (R. 892, JA-I, 637).

Dr. Lannon testified he thought that the odors from the Waterway "would postpone recovery of chronically ill patients, probably heart patients" (R. 525, JA-I, 598). Sister Evangelisten stated that the odor retards recovery and prolongs illness (R. 1188-1191, JA-I, 670).

The record, however, does not show one single instance of an actual case where recovery of a patient has been

retarded due to the proximity of the Illinois Waterway. The Special Master finds that "the average period of stay in St. Joseph's Hospital during 1939 was about one day less than the average for general hospitals in the country as shown by the records of the American Hospital Association." (Report of Special Master Lemann, p. 19.)

This finding is supported by Opponents' Exhibits 30 and 31 (R. 3985, 3988, JA-II, 122) which show that the average hospital stay of patients at St. Joseph's Hospital for the year 1939 was 11.48 days while the average stay of patients in general hospitals of the United States was 12.46 days. These records demonstrate that the theory that odors from Illinois Waterway have or might result in retarding the recovery of patients in hospitals is pure speculation and not based upon actual facts. While some patients, because of their illnesses, might find disagreeable odors annoying or uncomfortable, yet other patients might find the same condition true from inhalation of the odor of a rose (Dr. Wagner, R. 896, JA-I, 637-638).

The observations of the Special Master during the course of the hearings at Joliet that the testimony was not based upon anything that happened but on suggestive fears of what might happen (R. 482-483) is particularly applicable to the claim that odors from the Waterway retard recovery of patients in hospitals located near the Waterway.

There was some testimony to the effect that certain patients were so anxious to escape the odors from the Illinois Waterway that they left the hospital before they were ready for discharge. It is manifest that an early return from a hospital is not an unusual experience. Every hospital is faced with the situation where patients are anxious to return home before they are ready to be discharged and such patients often leave before they really should. Nevertheless no patient is ever permitted

to leave the hospital before the doctor on the case approves the discharge of such a patient. It is clear, therefore, that there is no foundation in the record for the contention that odors from the Illinois Waterway have retarded the recovery of patients in hospitals near such Waterway.

7. The proximity of the Illinois Waterway has not caused any general undermining of health of persons working or living along such waterway.

(a) The witnesses who testified at Joliet, with but one or two exceptions, were average, normal, healthy individuals of normal or above-normal weight who lost no time from work as a result of any illness.

It was manifest from the physical appearance of the witnesses who testified at the Joliet hearings that they were average, normal, healthy individuals, most of whom tended to overweight and who, with but one or two exceptions, had lost no time from work due to any illness These individuals all came from a community which the Health Commissioner described as a good, healthy community (Dr. Frederick, R. 464, JA-I, 589) and other doctors echoed this opinion, (Dr. Wagner, R. 893, JA-I, 637).

The only exceptions to the rule that the witnesses testifying at the Joliet hearings were average, normal healthy individuals, were the cases of the lady who testified that she became ill due to odors from the Illinois Waterway and her husband made her quit working (Mrs. Mitchell, R. 660, JA-I, 613) and the case of the doctor who testified that a patient of his, a river pilot, suffered an infection due to water sprayed from the Illinois Waterway during one of his trips. The doctor stated that he ordered this pilot to quit his work for a time and take a vacation in order to recover from the effect of the infection and from nervousness (Dr. Curtis, R. 569, JA-I, 603).

The Master noted, during the course of the hearings, that the people who testified at Joliet as to inability to eat and sleep all looked healthy and appeared to be tending to overweight and this fact was borne out by the testimony of the witnesses who were asked concerning their health (Callahan, R. 859-867, JA-I, 633; Mohr, R. 868-871, JA-I, 634; Koehl, R. 1308, JA-I, 685; Nichols, R. 1302, JA-I, 684; Imfeld, R. 1280, JA-I, 681; Argoudalis, R. 1277, JA-I, 681).

As the Master observed during the course of the hearings, "It seems pretty clear that the testimony so far is not supported by anything that has happened so far; that is, based upon anything but suggestive fears of what might happen. That, I think, is a bald summary of what they have said" (R. 482-483).

Nothing that transpired at the Joliet hearings after the above statement was made, nor any of the evidence given thereafter has changed the situation. The remaining testimony taken during the course of the week was mainly cumulative.

The statistical records of communicable diseases and the testimony of the doctors plainly establishes that as far as actual happenings go the condition of the Illinois Waterway has not been proven to be a menace to the health of the individuals residing along or working upon the Illinois Waterway at Joliet and Lockport, the two complaining communities.

(b) The condition of the Illinois Waterway has not affected the health of children in Lockport or Joliet.

Illinois contends that children in the Joliet-Lockport area have been particularly susceptible to odors from the Illinois Waterway resulting from the reduction in diversion in 1939. There was some testimony to the effect

that children during the warm weather in April and May of 1939 and 1940 suffered nausea and restlessness (Bush, R. 337-338, JA-I, 575; Wurtz, R. 379-381, JA-I, 578-579; Blatchley, R. 405, JA-I, 582).

It is common knowledge that school children are quite susceptible to illnesses and to symptoms such as nausea, but that they recover very promptly from the same. Nausea, whether suffered by children or adults, might be induced by any one of a great many causes (Dr. Wagner, R. 887, JA-I, 636). There was also testimony that the children at one of the schools who were most frequently ill were girls between the ages of 10 and 12 (Wurtz, R. 388-389, JA-I, 580). Temporary illness is to be expected in girls of that age and is a normal rather than unusual incident of a girl's childhood days.

The restlessness of children during the spring of the year can easily be explained by reason of the fact that with the coming of the vacation season children become restless and are affected, just as are adults, with what is commonly known as "spring fever" and a desire to escape from schoolroom confinement. Mary S. Wurtz, Principal of the McKinley Public School in Joliet who testified that during the years 1939 and 1940 some of the children became ill, also stated that she was not attempting to state the reason or causes for any of the illnesses mentioned; that she didn't know the causes (R. 389). Miss Wurtz further admitted that "children get sick any time of the year" (R. 384, JA-I, 579).

The evidence in these causes falls far short of establishing that the Illinois Waterway affects in any way the health of school children in Joliet or Lockport. On the contrary the testimony shows, at the most, that the school children residing adjacent to the Waterway are average, normal youngsters who become ill occasionally, stay home from school once in a while, become restless in the springtime when the weather begins to get warm, and, on occa-

sion, have to be sent home from school when they suffer a stomach ache brought on by too much candy, too strenuous play, the heat, or any one of a number of common causes not connected with the Illinois Waterway.

8. *The mortality and communicable disease rate statistics indicate that Joliet, Illinois, is a very healthy community.*

The mortality and communicable disease rate statistics as furnished by the Department of Health, State of Illinois, disclose that Joliet, Illinois, and other cities and villages located along or adjacent to the Illinois Waterway are very healthy communities insofar as communicable diseases are concerned (Opponents' Exhibits 1, 4, 5; R. 1919a, 1931, 2123; Opponents' Exhibits 6, 23, 24; R. 2126, 3454, 3460; JA-I, 96, 117, 121). Some of the doctors who testified at Joliet expressed the fear that a typhoid epidemic may result from the presence of the Illinois Waterway at Joliet (Dr. Faulkner, R. 935, JA-I, 640; Dr. Frederick, R. 455, JA-I, 588). However, the statistics show that not only are the typhoid cases and deaths very favorable in Joliet and other communities adjacent to the Illinois Waterway but that the death rates and case rates are much lower than they are in many other communities located away from the Waterway (Opponents' Exhibits 1, 4, 5, 6, R. 1919a, 1931, 2123, 2126, J.A.-I, 96).

In the original decision in these causes in the merits, the Court pointed out that it was postponing the restoration of the just rights of the complainant Great Lakes states for a number of years in order to eliminate any danger of an epidemic or pestilence due to water-borne diseases (278 U. S. 396). What the Court had in mind, of course, was the fear of contamination of the water supply of the City of Chicago if polluted sewage should reach the water intakes. It should be noted that no one of the cities along the Illinois Waterway takes its water supply from such stream but all the water is obtained from deep

wells, excepting Argo which purchases its water from the City of Chicago (Pearse, R. 1692, JA-I, 132; Cheadle, R. 437, JA-I, 586; Testim, R. 1368-1369, JA-I, 695).

The past health record of Joliet and other communities along the Illinois Waterway discloses that insofar as reportable diseases are concerned, such communities are very healthy places in which to live and the Health Commissioner of the City of Joliet, Dr. Frederick, admitted the health of the people of Joliet was very good (R. 464, JA-I, 589), and he further admitted that health conditions in 1939 were no worse in Joliet than health conditions in 1938 (R. 464, JA-I, 589).

9. *The air in the vicinity of the Illinois Waterway contains no more harmful substance or ingredients than does the air in localities away from such Waterway.*

(a) There are no more bacteria, toxins, bacilli or other harmful substances in the air at Joliet or Lockport than would be ordinarily found in localities away from the Illinois Waterway.

The examination of the contents of the air made at locations along the Illinois Waterway at Joliet and Lockport and at locations away from such Waterway proves conclusively that the inhabitants of Joliet and Lockport have no more to fear from the air over or adjacent to the Waterway than people residing or working in cities located away from such Waterway.

Opponents' Exhibit No. 7 (JA-I, 503, JA-II, 99) contains the results of an analysis of the air in the vicinity of Joliet and elsewhere on August 3, 1940. This exhibit as interpreted by Jenkins and Dr. Moore shows that the composition of the air above the Illinois Waterway is no different from the composition of the air in other parts of the state (Report of Special Master Lemann, p. 35).

Opponents' Exhibit No. 15 (JA-I, 503) is a report made by Dr. M. Starr Nichols concerning an analysis of the air

and water in the vicinity of Joliet, Illinois, made on September 28, 1940 (JA-I, 502-521). This exhibit discloses that the quantity and kinds of bacilli to be found in the vicinity of Joliet, Illinois, do not differ from the number and kind to be found elsewhere (Report of Special Master Lemann, p. 37). Illinois offered no proof of analyses of the air in or near Joliet.

(c) There is in the record no proof that any concentrations whatsoever of hydrogen sulphide have been or may be found in the air at Joliet or Lockport or any other place along the Illinois Waterway.

The witness Bergman (JA-I, 485-487) testified to the analysis of the air made at Lockport and Joliet, Illinois, on August 3, 1940, with respect to the amount of hydrogen sulphide, if any, in the air. Bergman testified that he was unable to find any trace of hydrogen sulphide in the air (JA-I, 485; Report of Special Master, 34). It should be noted that neither the petitioner, State of Illinois, which has been making many exaggerated claims concerning pollution of the air in the vicinity of Joliet and Lockport, nor its agency, the Sanitary District, made any attempt to analyze the air at Joliet for hydrogen sulphide. No record whatsoever as to what amount of hydrogen sulphide, if any, has been or may be found either in the water of the Brandon Road Pool or in the air above Brandon Road Pool or elsewhere along the Illinois Waterway was ever made by Illinois or the Sanitary District (Report of Special Master Lemann, 37). On the other hand, numerous witnesses testified that it would be utterly impossible for a sufficient concentration of hydrogen sulphide to be present in the air above the Illinois Waterway which would or could be detrimental to the health of individuals on or near such Waterway and thus constitute a menace to health (Dr. Enzer, R. 2173; Dr. Krumbiegel, R. 2198-2199 and 2188; Howson, R. 1948; Nichols, R. 3131-3132).

The evidence is clear that hydrogen sulphide diffuses very rapidly in the air (Dr. Krumbiegel, JA-I, 559, 562; Dr. Enzer, R. 2168, 2174, JA-I, 548, 551; Dr. McNally, JA-I, 492). Dr. McNally testified that at 500 to 1000 feet away from the point of origin, hydrogen sulphide would diffuse into the air many thousand times (R. 2673, JA-I, 492; Report of Special Master Lemann, 38).

(c) The record in these proceedings conclusively establishes that none of the ailments or illnesses complained of was due to hydrogen sulphide from the Illinois Waterway.

We submit that the record conclusively establishes that none of the ailments or illnesses complained of by the Joliet witnesses was due to the hydrogen sulphide from the Illinois Waterway. Muehlberger in testifying to the symptoms of sub-acute hydrogen sulphide poisoning stated "they are symptoms of irritation, irritation of the mucus surfaces, *primarily those of the eyes which result in a burning sensation of the eyes;* * * *" (Italics ours—R. 2791, JA-I, 297).

Dr. Mohlman testified that at the Sanitary District of Chicago they "had times when the operating of the hydrogen sulphide did result in some sickness and effect on the eyes of the men working there, and that condition does not apply now, but it did happen" (R. 1917, JA-I, 219-220). Mohlman further testified that when the old West Side plant first started up hydrogen sulphide in the enclosed operating gallery did affect their eyes (R. 1917, JA-I, 219-220).

According to the above testimony of Muehlberger, toxicologist, called by the State of Illinois, one of the first effects of hydrogen sulphide on the human system would be to attack the mucus membrane of the eyes causing irritation and a burning sensation. Mohlman, sanitary expert for the Sanitary District, likewise testified that the only case of illness that he knows of to workmen caused

by hydrogen sulphide gases in the plants of the Sanitary District was in the old operating gallery of the old West Side plant when in an enclosed space the hydrogen sulphide gas irritated the eyes of the workmen.

It is significant that not a single witness at Joliet testified to suffering from a burning sensation of the eyes or of any irritation of the eyes. Had the various ailments and illnesses testified to by the Joliet witnesses, such as nausea, headaches, inability to find sleep easily, loss of appetite, and the like, been due to hydrogen sulphide gas, it is clear that such gas in concentrations sufficient to cause the ailments complained of would also have been sufficient to have caused irritations of the eyes in at least some of the cases.

10. *The records in the office of the United States District Engineer at Chicago, Illinois, confirm the conclusion that the Illinois Waterway constitutes no menace to the health of persons residing, working or traveling near or on such waterway.*

At the request of the Special Master, the United States District Engineer's office at Chicago, Illinois, prepared a statement, dated February 3, 1941, showing the amount of time lost from work during the years 1938, 1939 and 1940 through illness and injuries by male employees of the United States War Department in the Chicago District:

	Average Days sick leave per 305 work days		
	1938	1939	1940
Chicago District office	2.22	5.65	5.74
Joliet area	2.94	5.46	4.88
Calumet Harbor and Blue Island area	2.69	5.97	4.58
Peoria area	2.34	2.43	3.83

This exhibit shows that the total number of days' absence on sick leave in the Joliet area was greater in 1939

than in 1938, but there was a similar increase in the Chicago District office and in the Calumet Harbor-Blue Island area in the year 1939 as compared with 1938. This demonstrates conclusively that the increase in days of absence on sick leave at Joliet during 1939 was not due to any special conditions prevailing at Joliet. Moreover, the percentage of days sick leave in the Joliet area in 1940 was less than in the Chicago District office during 1940. Only in the Peoria area does the total number of days of absence on sick leave seem to be substantially less than either in the Chicago District office, in the Joliet area or in the Calumet Harbor-Blue Island area.

The conclusion to be drawn from the statement dated February 3, 1941, submitted to the Special Master showing the record of absences on sick leave and injury, is that the Illinois Waterway was and is not responsible for any illness or ailments resulting in sick leave on the part of the male employees of the United States District Engineer's office at Joliet by reason of any special conditions prevailing at Joliet, Illinois.

The Special Master in his Report, at pages 20 and 21, comments on the above figures and also reaches the conclusion that the Illinois Waterway does not constitute any menace to the health of persons residing or working along or on the said Waterway at Joliet.

11. *The medical testimony with respect to the effect of the actual condition of the Illinois Waterway on the health of the inhabitants of Joliet and Lockport, conclusively establishes that the Illinois Waterway has not and does not now constitute a menace to the health of such persons.*

(a) The record establishes that the Illinois Waterway has not in the past and does not now constitute a menace to health.

The medical experts called by the State of Illinois and the opposing Great Lakes States were divided in their

opinions and conclusions concerning the effect of the actual condition of the Illinois Waterway on the health of the persons working on or near or residing near such Waterway. Among witnesses who testified for the opposing Great Lakes States on the health question were Doctors Enzer, Krumbiegel, Gute, Perkins, McNally and Moore.

1. *Dr. Norbert Enzer.*

Dr. Enzer testified that in his opinion any odors emanating from the Illinois Waterway at any season of the year would not constitute a menace to the health of the people of Joliet or other communities along the Illinois Waterway who inhale such odors (R. 2148, 2149, JA-I, 538-539).

Dr. Enzer further stated that the Illinois Waterway does not constitute in any sense an actual menace to the health of the inhabitants at Joliet and Lockport inasmuch as such Waterway is not used as a source of domestic water supply and is not used for bathing or other recreational purposes at Lockport (R. 2149-2150, JA-I, 539). Dr. Enzer stated further that such Waterway would not constitute a menace by reason of any airborne diseases from a structure of that nature and that at the most one might suffer discomfort or annoyance from an odor to which one might not be accustomed (R. 2150-2151, JA-I, 539-540).

He was of the opinion that the present conditions along the Illinois Waterway would not be materially improved from a health standpoint by an increase in the present diversion of 1500 c. f. s. to 5000 c. f. s. plus domestic pumpage (R. 2152-2153; 2166-2167, JA-I, 540-541, 547).

Dr. Enzer assumed in his opinion that the water was heavily polluted and heavily filled with bacteria and the like (R. 2158-2160, JA-I, 543-544). Dr. Enzer disagreed with the opinion expressed by Dr. Frederick, Health Commissioner of Joliet, with respect to the spreading of disease from the sewage in the Canal by insects, flies and the like (R. 2152, 2162, JA-I, 540, 545-546).

Dr. Enzer also testified that in his opinion it would be utterly impossible for concentrations of hydrogen sulphide sufficient to be harmful or constitute a menace to health to be present on or along the Illinois Waterway (R. 2173-2174, JA-I, 551). Dr. Enzer stated that he had been to Mt. Clemens, Michigan, and French Lick Health Resorts where the hydrogen sulphide content in the water and the air is very high and that those are places where people go for health purposes (R. 2175-2176, JA-I, 552; Report of Special Master Lemann, p. 36).

2. *Dr. Edward R. Krumbiegel.*

Dr. Krumbiegel, Health Commissioner of the City of Milwaukee, a witness for the opposing Lakes States, testified that in his opinion no odor emanating from the Illinois Waterway in the regions of Joliet or Lockport directly and solely of itself is the cause of any disease in the people living along the Waterway (R. 2179, JA-I, 554) and that the Illinois Waterway does not constitute an actual menace to the health of the inhabitants of Joliet or Lockport at any time of the year (R. 2180, JA-I, 554).

Dr. Krumbiegel was of the opinion it would be difficult to conceive of this Illinois Waterway giving off so much hydrogen sulphide as to cause illness in the people living along the course of the Waterway (R. 2186, 2198-99, JA-I, 557, 562). It was his judgment that if you exclude the possibilities of the water of the Illinois Waterway being used for drinking or bathing, there would be no potential menace from the presence in the stream of untreated or partially treated sewage (R. 2190, JA-I, 558). He testified further that he knew of no figures of any experience as to epidemics having been caused solely by hydrogen sulphide in the air and that he knew of no recorded cases indicating that the health experience, in health work, where illnesses among a substantial number of people, had been traced solely to hydrogen sulphide

in the air (R. 2194, JA-I, 560). He then stated that in connection with this problem, when one speaks of nausea, loss of appetite and things of that type, one is speaking of symptoms which are not open to proof of any kind and that one could say he had a terrific headache and no one in the world could prove or disprove whether he did or did not have that headache; and that if a person vomited today and didn't vomit after today, one could not say he was sick, but if one vomited every day it might produce serious results (R. 2195, JA-I, 560). He concluded then that the present conditions along the Illinois Waterway did not constitute a real and immediate menace to the health of the people working thereon or residing nearby (R. 2198, JA-I, 561).

Dr. Krumbiegel testified that hydrogen sulphide diffuses immediately into the atmosphere and people could develop symptoms from hydrogen sulphide only if there were enough hydrogen sulphide to affect them and that would vary with the individual (R. 2193, JA-I, 559); for example, some people might find the fecal material of cows very obnoxious and yet millions of farmers live in and around such fecal material daily (R. 2193).

3. *Dr. Edwin B. Gute.*

Dr. Edwin B. Gute of Milwaukee, Wisconsin, Health Commissioner and Director of School Hygiene of the Village of Fox Point, Wisconsin, and Director of School Hygiene of the Village of White Fish Bay, Wisconsin, testimony was the same as Drs. Enzer and Krumbiegel (R. 2209-2211, JA-I, 565; Report of Special Master Lemann, pp. 36-37).

4. *Dr. James E. Perkins.*

Dr. James Eliab Perkins, Director of the Division of Communicable Diseases of New York State Department of Health, testified that in his opinion an additional diver-

sion of 3500 c. f. s. would not decrease the amount of typhoid germs present in the water and that there was a possibility that they might even increase (R. 2468, JA-I, 523) and that the only communicable diseases in the Waterway would be typhoid and bacillary dysentery (R. 2468, JA-I, 523) and that individuals could only contract these diseases by swallowing water from the Canal (R. 2469, JA-1, 524). He stated that an adequate concentration of chlorine would kill the typhoid bacillus (R. 2469) and that flies are not of importance in the transmission of typhoid germs from the Canal (R. 2470, JA-I, 524) since the house fly is the only one who transmits typhoid fever but that this type of fly does not light upon the water, but the house fly might carry germs from open privies and open pits filled with fresh excreta from men and carry them to mess kitchens and mess halls, etc. (R. 2470-2471, JA-I, 524-525).

Dr. Perkins disagreed with the opinion of Dr. Frederick, Health Commissioner of Joliet, that the scum on the Waterway dries and might be carried away by winds for miles (R. 2471, JA-I, 525) since typhoid bacillus is readily destroyed by sunlight and drying and under the circumstances present at Joliet you would not have any live typhi bacilli (R. 2471, JA-I, 525). Dr. Perkins testified that a polluted stream containing hydrogen sulphide would not be a menace to the health of the surrounding country because in his opinion a polluted stream could not give off sufficient hydrogen sulphide (R. 2476, JA-I, 526). He stated that you could have enough hydrogen sulphide to give a very distinct odor and yet have it below the amount necessary to cause toxic symptoms (R. 2480, JA-I, 527). Dr. Perkins in response to questions by the Master testified that in his experience he had never heard of germs being wafted through the air from a polluted stream (R. 2491, JA-I, 530) and that the only possibility of health trouble from this stream would be either by drinking the water or swimming in it (R. 2491, JA-I, 530).

He disagreed with testimony given by some of the doctors at Joliet that there were streptococci germs in this water and that trouble could be experienced with nose and throat and sinus ailments (R. 2491, JA-I, 530).

5. *Dr. William D. McNally.*

Dr. William D. McNally, a toxicologist, called by the opposing Great Lakes States testified that in his opinion the Illinois Waterway, as the result of receiving untreated or partially treated sewage, is not a menace to the health of the inhabitants of the communities of Joliet and Lockport or the people working or sleeping on boats over such Waterway, from the presence of hydrogen sulphide (R. 2669, 2700, JA-I, 491). Dr. McNally testified that at 100 or 500 or a thousand feet away, the concentration of hydrogen sulphide gas would be diluted many thousand times (R. 2672, JA-I, 492) because it diffuses in the air very rapidly (R. 2673, JA-I, 492). He stated that there are no recorded cases of epidemics of illness from hydrogen sulphide breathing from open waterways like the Illinois Waterway (R. 2678, JA-I, 494) and that the literature of toxicology says nothing about deleterious effects of hydrogen sulphide from the Waterway (R. 2679, JA-I, 494).

Dr. McNally further testified that automobiles give off a poisonous gas and that a 1% concentration of carbon monoxide gas would kill within 2 or 3 minutes (R. 2699, JA-I, 501) and that the characteristics of carbon monoxide and hydrogen sulphide are similar in reactions and they are very toxic gases (R. 2699, JA-I, 501) and that a sufficient quantity of hydrogen sulphide could be introduced into the air from railroad trains to cause discoloration of painted houses located some distance away (R. 2702, JA-I, 501).

6. *Dr. Josiah J. Moore.*

Dr. Josiah J. Moore, a physician and pathologist of Chicago, a witness for the opposing Great Lakes States,

was of the opinion that any bacteria from the scum on the surface of a polluted waterway, or germs or bacteria present in the scum on the sides or wall of a polluted waterway would not be blown away in such a way as to cause a hazard, producing disease to people along the Waterway (R. 2652, JA-I, 531). He stated that no epidemic could occur in a community adjoining a Waterway containing untreated or partially treated sewage as a result of the transmission of germs or bacteria from such a waterway by air (R. 2652, JA-I, 531). Dr. Moore testified that in his opinion from a bacteriological study of an analysis of the air in the vicinity of Joliet and Lockport along the Illinois Waterway as indicated by tests shown on Opponents' Exhibit 7, that the air in that vicinity would constitute no danger to the health of the people along the Waterway (R. 2653, JA-I, 531-532). He stated there was no basis for any suggestion that germs from this waterway might cause streptococcic infections in the throat (R. 2657, JA-I, 532) or nose (R. 2658, JA-I, 532) and that any such infection would be due to contact carriers, one individual to another and not by water (R. 2658, JA-I, 532). He was of the opinion that one could not get streptococcus sore throat from sewage odors and you could not get it by living on the banks and breathing the air (R. 2659-2660, JA-I, 533). He stated there was no source of danger from B. coli since in its proper place it is not pathogenic and if there were any other organisms in the water containing B. coli we could drink water and simply increase the number in our own intestinal tract without causing a disease in the intestinal tract (R. 2768-2769, JA-I, 534); and the only danger from B. coli would be where they had gotten out of the intestines of the patient or by penetration of the skin (R. 2770, JA-I, 534); but one could not get B. coli by breathing the air over this Waterway (R. 2771, JA-I, 535).

(b) The conclusions of the Medical Experts called by the State of Illinois with respect to conditions which they suggested should obtain at Joliet were based upon generalities and Standards which do not exist in any other Industrial Community in America.

1. *Professor Anton J. Carlson.*

The chief medical expert on the health question for Illinois was Dr. Carlson. He inspected the Illinois Waterway on October 13, 1940 and had read much of the testimony at Joliet. He testified that in his opinion "the present condition is more than a menace to health; it is inimical to health" and he stated that the factors he would consider in determining what constituted an actual menace to health means that conditions exist in the Waterway that through accident or ordinary course of human events can lead to injury to health (JA-I, 284-285). He was of the opinion that one does not have to prove actual injury to health but that you have to prove that conditions exist there which through accident or ordinary course of human events may result in injury to health. Dr. Carlson further indicated his view that there was an actual menace from dysentery bacilli, from typhoid bacilli and from the amoeba of dysentery. It was his view that water does not have to be used for drinking or cooking to constitute such a menace and it does not have to occur either for 10 or 15 years, but it is still a menace (JA-I, 284). The fact that the present communicable disease rate in Joliet is no higher than in Joliet is of no importance whatsoever in dedetermining whether the Canal is a menace to health. He was of the opinion that either they have been lucky or that the medical statistics were not what they were supposed to be (R. 2891, JA-I, 285). It was also his view that the Waterway has been a menace to health since 1934 but that the menace has now been increased but he agreed that if the diversion from Lake Michigan were restored

to 5,000 c. f. s. there would still be a menace to health, but that it would be less (R. 2980, JA-I, 289). Dr. Carlson likewise agreed that carbon monoxide from automobiles in the City of Chicago is a constant detriment to the health of the people residing therein (R. 2975-2978; JA-I, 288, See also: Report of Special Master Lemann, pp. 41-43).

2. *Professor Andrew C. Ivy.*

Professor Ivy was of the opinion that smoke, dust, noise, stray dogs, streams containing untreated sewage, pollution of air from any source, and the like all constituted a menace to health (R. 3037, 3052, 3058, 3060-61, 3075, JA-I, 306, 315, 318, 319) and should be abated. He was further of the opinion that an increase in the amount of the diversion would not eradicate the menace but would only decrease it (R. 3052-3053, JA-I, 315). He stated that the public health of Chicago was good insofar as communicable diseases, infant mortality, typhoid are concerned (R. 3070, JA-I, 324) but that due to smoke, dust, noise and other factors of that sort, the public health of Chicago is not so good (R. 3071, JA-I, 324; Report of Special Master Lemann, pp. 43-45).

3. *Professor Hugh A. McGuigin.*

Professor McGuigin was of the opinion that there may be conditions which are detrimental to health at Joliet which are unknown because the causes are unknown (R. 3087, JA-I, 330) and that if you do not know the cause you cannot eradicate it but that in many cases one could ameliorate it (R. 3088, JA-I, 330). He admitted that there were certain deterrents operating and producing ill health among people the causes of which are not known but that this condition is universal and not confined to Joliet (R. 3088, JA-I, 330). He admitted that if a large number of people were ill in a community the death rate would be higher because of the reduced resistance of ill people to most diseases (R. 3089, JA-I, 330; Report of Special Master Lemann, p. 45).

4. *C. W. Muehlberger.*

Mr. Muehlberger testified that hydrogen sulphide in dilute quantities acts as an irritant; it irritates the mucous membranes, primarily those of the eyes, causing a burning sensation of the eyes, irritation of the nose and throat (R. 2791, JA-I, 297), while in high concentrations there is a nervous depression resulting in symptoms of drowsiness, stupor, coma, finally causing death (R. 2788, JA-I, 295). He was of the opinion that people are entitled to a decent place to live, comfortable surroundings where the air they breathe is perfectly good healthy air and that anything which can be overcome which contaminates the air so that people aren't in a good sound state of health is a menace (R. 2810, JA-I, 303). He was unable to cite any specific instance of an individual having been overcome by hydrogen sulphide gas in the open from a waterway polluted with sewage (Report of Special Master Lemann, p. 40). He knew the Drainage Canal smelled prior to 1939 but he never noticed any irritation of his eyes or throat, or didn't notice them, prior to 1938 (R. 3011, JA-I, 303; Report of Special Master Lemann, p. 40).

12. *The Record Establishes that the State of Illinois has never Seriously Regarded the Illinois Waterway as a Menace to the Health of the Inhabitants of the Complaining Communities.*

As has been indicated elsewhere in this Brief, the Illinois Waterway has been a polluted stream for more than forty years and it has given off odors during all of that time and complaints concerning its condition have been made from time to time for more than twenty years. It is significant that at no time has the State Board of Health of Illinois or the Health Commissioners of Joliet ever officially declared that the Illinois Waterway constituted a menace to health or that an emergency existed by reason of the condition of the Illinois Waterway at Lockport and Joliet.

The Special Master points out that no representative of the Illinois State Board of Health or any Sanitary officer of the State of Illinois appeared before him to testify concerning health conditions (Report of Special Master Lemann, pp. 45-46). The Chief of the Illinois State Waterway Survey, Dr. A. M. Buswell testified for the Respondent Great Lakes States in support of their contentions concerning their ameliorating measures but he was not asked concerning health issues.

13. *The proper test of a "menace to health" is the effect of the conditions complained of upon persons in normal health and not the effect upon sickly persons or those below average health.*

Illinois complains that the Special Master failed to accept the proper definition of "menace to health" as presented by the testimony. We respectfully submit that the conclusion of the Special Master that "the test is the effect of the acts complained of upon persons of ordinary sensibilities and in normal health" is correct and that the effect of the odors upon invalids or persons of less than average health could not be accepted as any test of health menace. Moreover the record establishes conclusively that the ailments complained of by the witnesses who testified at Joliet are trivial, inconsequential, transient and such as are common to all persons everywhere and that such ailments have not resulted from, or been caused by, the Illinois Waterway. The witnesses who testified at Joliet were, with one or two exceptions, healthy, normal persons, most of whom inclined to overweight. As the Special Master points out, even in private cases the test has never been the effect of the acts complained of on sickly, invalid or neurotic individuals.

PART FIVE.

A. MISCELLANEOUS MATTERS.

1. *Illinois' Contention that No Measurable Harm Will be Done the Great Lakes States by the Increased Diversion from Lake Michigan, Suggested by the Modified Petition of Illinois, is Wholly Without Merit.*

It is settled that the illegal diversion of water from Lake Michigan by Illinois and its agency, the Sanitary District of Chicago, has substantially lowered the levels of the Great Lakes and such lowering of the natural levels of the Great Lakes has caused great continuing damage to the respondent Great Lakes states and their citizens and that the restoration of normal lake levels and the termination of such continuing damages to the respondent Great Lakes states and their citizens will require a period of fire years after the termination of the illegal diversion of water from Lake Michigan by Petitioner and its agency, the Sanitary District of Chicago.

These matters are all severally *res adjudicata* under the decisions and decree of this Court (*Wisconsin et al* v. *Illinois et al,* 278 U. S. 367; Decree of April 21, 1930, 281 U. S. 696).

The modification of the decree as requested by the petitioner State of Illinois would, if granted, postpone the restoration of normal lake levels and the termination of these continuing damages to respondents and their citizens for a period of several years. During most of the navigation season of 1940 the draft of vessels carrying the great ore, coal and grain traffic between the head of the lakes and lower lake ports was very much restricted

greatly reducing the loads which could be carried by vessels carrying ninety per cent of this traffic, in comparison with the loads which could have been carried but for the lowered lake levels caused by the diversion through the Chicago Drainage Canal.

The lowering effect which would result from the temporary increased diversion from Lake Michigan, as requested in the modified petition of Illinois, would cause great and irreparable damage, regardless of whether such lowering would be one-third of an inch, or one-half of an inch, or one inch, inasmuch as any slight lowering of lake levels of even a fraction of an inch will result in great damage to the respondent Great Lakes states and their citizens. (Report of Special Master Hughes (1927), pages 114-115. See also the opinion of Secretary of War Stimson denying a request for increased diversion which opinion is quoted in part in the report of Special Master Hughes, page 62. Secretary Stimson points out that every drop of water taken at Chicago tends to nullify costly improvements made by Congress, as well as inflict a heavy loss upon navigation interests. *Wisconsin et al* v. *Illinois et al,* 278 U. S. 367, 409).

And as Special Master, Honorable (now Chief Justice) Charles Evans Hughes pointed out the damages and losses to the respondent Great Lakes states and their people are greatest when the mean water levels on the Great Lakes are the lowest. (Report of Special Master Hughes (1927) page 116).

It is clear the court considered the matter of damages to the opposing Great Lakes States by an increase in diversion at Chicago to be closed and not open to consideration again. Illinois raised the issue of damages in its petition, this issue was controverted in the return of the respondent Great Lakes states, and the Court did not include this

issue among the subjects of inquiry by Special Master Lemann, thereby closing the door to a further discussion of this subject.

2. *The Special Master's Recommendation for a Decree dismissing the petition and modified Petition of the State of Illinois with costs against the State of Illinois should be affirmed.*

The record in this case establishes that the Special Master's Recommendation for a Decree should be affirmed. It is clear that costs, including the fees and disbursements of the Special Master, should be taxed against the State of Illinois.

On the previous decision in these causes, the court found that Illinois and the Sanitary District had for many years mantained an unlawful diversion in contravention of the rights of the states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York, and that through such illegal action on the part of Illinois and the Sanitary District of Chicago, the opposing Lake States had sustained great damages to their navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, to public parks and other interests, and to riparian property in general (*Wisconsin et al* v. *Illinois et al,* 278 U. S. 367, at 407-9). The respondent Great Lakes States were compelled to prosecute long and expensive litigation to vindicate their rights and the rights of their citizens. There is no instance of such vast injuries being suffered with such great patience as has been exhibited by the respondent Great Lake States and their peoples in connection with this controversy. All other recourse failing, they were compelled to resort to litigation before this Court. The right of the states of Wisconsin, Minnesota, Ohio, Pennsylvania, Michigan and New York to relief has been sustained; and we regard it

as clear under the decisions of this Court that said Lake States are entitled on the record to a recovery of their costs (including the fees and disbursements of the Special Master) from the State of Illinois. (*North Dakota* v. *Minnesota*, 263 U. S. 583; *Wisconsin et al.* v. *Illinois et al*, 281 U. S. 200; 289 U. S. 395, 77 L. Ed. 1292.) Moreover, Illinois and its agency, the Sanitary District of Chicago should be compelled, in all fairness, to reimburse the Lake States for all expenses by way of expert witness fees, and the like, from the sum of $12,500.00 which was realized as additional profit from the 10 day flushing test to which the Lake States agreed (Report of Special Master Lemann, p. 82).

CONCLUSION.

We respectfully submit that upon the whole record herein the recommendation of the Special Master that a decree be entered dismissing the petition and the modified petition of the State of Illinois for modification of the Decree of April 21, 1930 and taxing costs (including fees and disbursements of the Special Master) against the State of Illinois, should be affirmed.

Respectfully submitted,

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